The OIL WEEKLY

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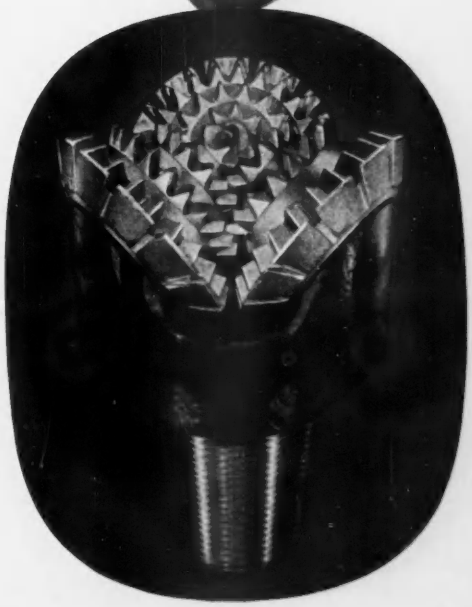

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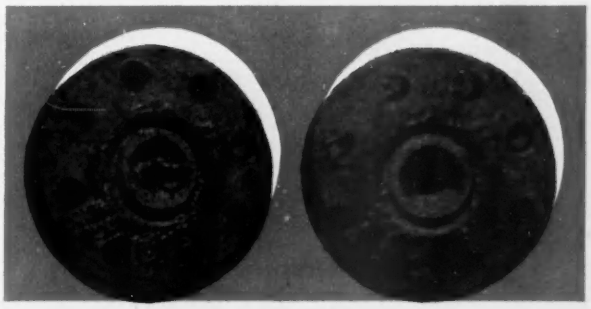

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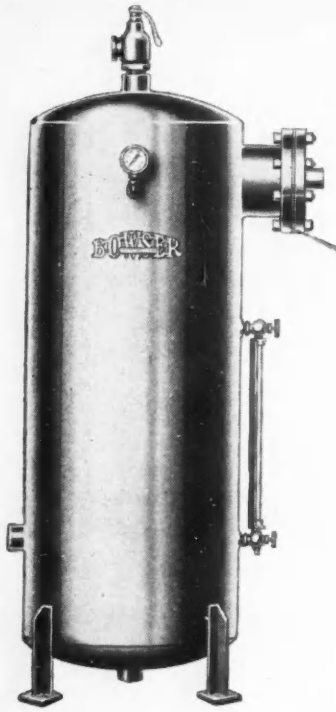

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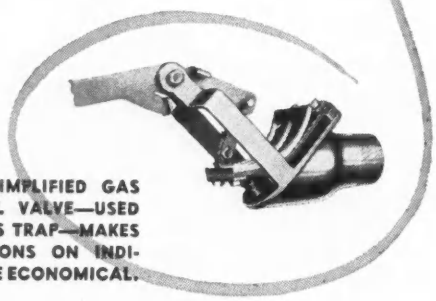

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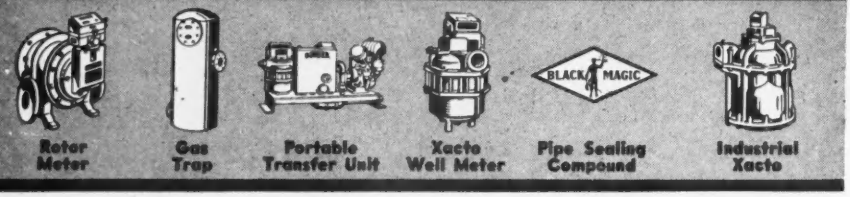

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Looking Ahead

WITH THE EDITOR

PALEONTOLOGY, a science shunned by some, but very important to the correlation of unfamiliar formations, has successfully found its way into the petroleum industry and may be compared to well logging and geophysics for its part in finding oil. In the quiet laboratories, paleontologists bend patiently over microscopes studying slides and formations in the search for more knowledge of fossils. Their unending efforts have contributed heavily to the discovery of new fields and have been of paramount importance in making correlations in formations. For it is through paleontology, that branch of geology that treats of life in past geological periods, that proper orientation of formations can be made. It is through paleontologists, with the aid of geologists, that missing strata are detected. Their work has been essention in clearing up much confusion in subsurface correlation of such areas as West Texas, New Mexico, Egypt and other regions where geophysics and well logging did not tell the whole story.

A treatise on the subject, bringing to the foreground the importance of the work and its relation to other phases of petroleum exploration work, will be presented by Dr. J. Harlan Johnson of the Colorado School of Mines, in "Paleontology and Its Relation to Petroleum Geology," to appear in next week's issue of THE OIL WEEKLY. In his article, Dr. Johnson discusses the growing importance of paleontology and its application in geological and geophysical studies. The search for new types of petroleum reservoirs will require much work by paleontologists to adequately correlate the formations and prospective producing beds. As the quest for oil proceeds, the importance of paleontology increases.

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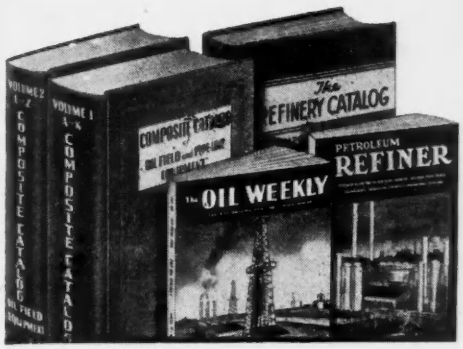

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PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

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ENGINEERING NEWS STATISTICS

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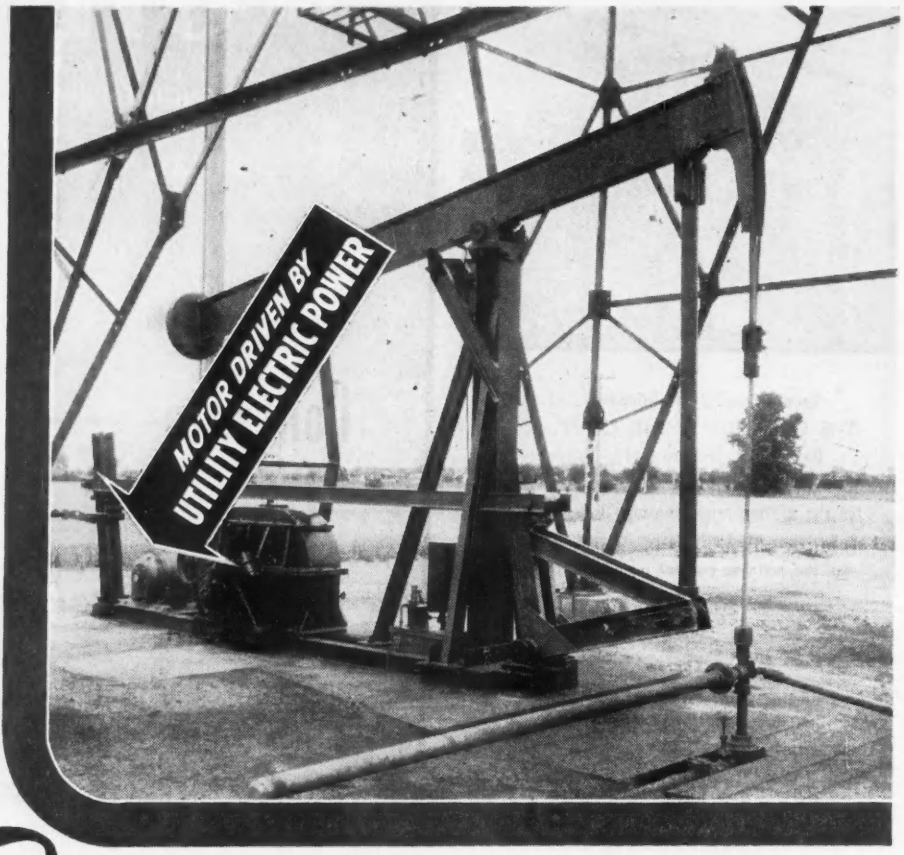

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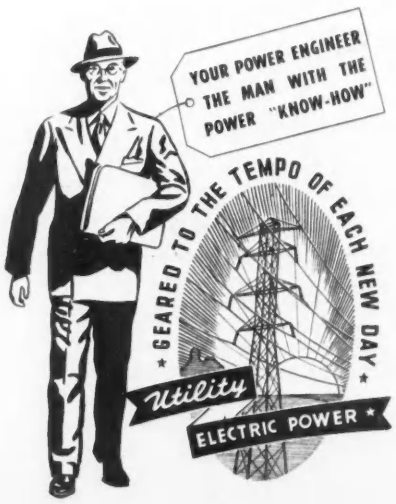

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Regulating Labor's Robber Barons

An Editorial

THE real meat in the cocoanut of the coal strike and general labor union situation is being overlooked in many public discussions.

It is that union monopoly of power, fostered by legislation which deliberately sought to put a segment of our population in control over the remainder of our citizenry, has at last borne such ugly fruit that the entire public safety is being threatened.

United States industry and industrialists over a period of years have been regulated by statute, not because all industrial concerns and industrialists are crooked or want to operate in a manner that threatens public safety, but because some of them showed such arrogant disregard for ethics and the public welfare that their regulation became mandatory.

If we grant that most labor leaders are fair minded, public spirited citizens, we still must admit that there may be among them men who, like some industrialists, hold the public good in low regard. If there were industrial robber barons, as our pinkie friends love to say, then is it unreasonable to assume that there could not possibly be men who would be willing to be union robber barons?

The answer is not subject to guessing. There are among the labor leaders men who hold the public good in lower esteem than the basement to a coal mine. They have become so arrogant, under favorable legislation and an even more favorable political climate, that unless their power is curbed, the country is going to hell.

The actual problem of fair treatment for labor—which should always have the sympathetic attention of the public—is not at this moment involved.

The real question is whether or not the American system will survive or give way to one of two kindred things: dictatorship of the type they have in Russia or dictatorship of the type they had in Germany.

No union member, excepting those imbued with a desire to upset our entire scheme of things, should object to seeing curbed a power which threatens him as well as his neighbor. There is a vast difference between making labor unions responsible, in curbing the power of an individual over the lives of thousands of people, and "baiting labor." That expression "labor baiter" is being applied by irresponsible labor leaders to men who are genuine friends of labor.

Of course, regulation of unions is coming. Some unions have shown that they have to be regulated. Some union leaders have shown that they are unfit for leadership. Union men generally should hope and work to the end that the regulation be fair down the line. General strikes, threats of stoppage of public water service (as occurred in at least one city this year), strikes in disregard of contracts, and all the other things which the public feel are unfair practices on the part of the union, should be scrutinized by union men with regard to their ultimate effects on the union cause. Only by following a policy of caution can the labor movement save itself from the follies of its leadership, and obtain regulation which will have no punitive factors in it.

* * *

Americans want a Supreme Court composed of judges and not of protagonists of clashing political programs, who, impatient with the slower pace of the people and their representatives in Congress, arrogate unto themselves the functions of a super-legislature.

—SAMUEL B. PETTENGILL.

Oil Leads the Push For Improved Living

RESEARCH financed by the petroleum industry is assuming gigantic proportions. Since V-J day, hardly a week has passed but that some company has announced plans for a new laboratory or expansion of existing plants and projects.

And startling discoveries seem almost commonplace. The number of new materials that can be made from petroleum and natural gas grows by leaps and bounds. Here are a few listed by Robert P. Russell, president of Standard Oil Development Company:

Synthetic soaps of superior quality; a type of resin that can be made into thin sheets and wrapped around perishable food products, keeping them fresh during weeks of storage; and cheaper but highly effective fungicides and insecticides.

One phase of this research, viz., conversion of coal and gas to liquid fuels, is being emphasized because the cost of finding and producing oil is on the increase. On the other hand, large reserves of natural gas already exist with additional deposits discovered right along. And, of course, the country's coal reserves are enormous. Standard is said to be devoting nearly one-third of all its research efforts toward such conversion.

Fear of an oil shortage is not the reason for this energetic research. Most competent observers agree with Eugene Holman's (Standard, New Jersey president) recent statement that the industry expects the U. S. to have as large proved oil reserves 20 years from now as it has today. Rather, it shows that "Petroleum Is A Progressive Industry," that it undertakes to make the most of a nation's raw resources to the end that it, along with all other industries and, indeed, the entire people can benefit as standards of living are raised and life made fuller as result of scientific probing.

THE WEEK'S NEWS

CONTROVERSY over the peacetime use of the Big Inch pipe lines has been ended by a WAA announcement that the Symington report practically confining them to oil exclusively has been scrapped and new recommendations will be submitted to Congress permitting sale of the lines for natural gas to the highest cash bidder, subject only to security safeguards and a requirement that gas now being wasted shall be utilized. In the meantime gas was turned into the lines by TGT which holds a four-month lease. Story below.

Coal Strike and Oil Supplies—Oil-field operations are due to be indefinitely delayed as a result of the coal strike, as steel production continues to decline and the railroads are restricted to the hauling of essential freight.—Page 29.

Wells in Open Gulf—Reports indicate two more companies will start soon drilling wells on locations in the open Gulf of Mexico.

Petroleum Public Relations—API has announced the personnel of the general committee which will head up its public relations program. Page 29.

New Depth Record—Pacific Western Oil Corporation's National Royalties 1 in Kern County, California, last week reported a depth of 16,668 feet which exceeds by 13 feet the previous record depth held by a Brazos County, Texas, well. Page 29.

Lines Authorized by FPC—Two pipe lines from Texas oil fields to the Middle West were authorized last week by the FPC. Page 30.

Murray Succeeds Jester—William J. Murray, Jr., former chief enforcement officer of the Texas Railroad Commission, will succeed Governor-Elect Jester as railroad commissioner. Page 28.

Sale of Royalty Oil—Royalty oil from unitized areas in the Kettleman North Dome (Cal.) and salt Creek (Wyo.) fields, amounting in 1945 to some 1,175,000 barrels, will be offered for sale by the Interior Department December 17 under the O'Mahoney Act giving a preference to independent refiners without adequate supplies of crude. Page 30.

Synthetic Fuels Experts—The War Department has imported a number of German scientists and technicians to work on synthetic fuels, rockets and other objectives, some of whom may be released to general industry in the near future.

O'Mahoney Final Report—The Senate Special Petroleum Committee will file its final report on its long investigation of the oil situation and national oil policy within the next two weeks, reportedly urging full government support of nationals operating abroad and opposing any international control organization. Page 28.

No Elk Hills Agreement—Navy and Standard Oil Company of California officials have been unable to reach a decision over the division of the cost of maintaining the Elk Hills Naval Reserve in a state of readiness. Page 29.

Congress to Get New Recommendations Permitting Disposal of Big Inch Lines

With the closing of hearings before the House Surplus Committee, the way was paved for consideration by Congress of a new policy for permitting disposition of the Big Inch Pipe Lines for use as natural gas carriers to the highest cash bidder.

That such a policy would be reported was disclosed by War Assets Administrator Robert M. Littlejohn in the closing hours of the hearings.

As the committee concluded its investigation, it had as its accomplishments the blocking of sale of the lines to Big Inch Oil, Inc., finally admitted by Littlejohn to be the lowest of the four bidders making the highest cash offers, and the putting of the lines to work to carry gas to the Appalachian area during the coal-strike emergency.

Ralph K. Davies, acting director of the Oil and Gas Division, reported that gas went into the line early Thursday afternoon, less than 72 hours after Tennessee Gas and Transmission Company was given a four-month lease.

Interior Secretary J. A. Krug, subpoenaed, told of the TGT agreement to carry natural gas to Ohio destinations. (See next page). Krug said the gas would release coal for use in the East, that within a week 50 million cubic feet a day would be moving through the lines and the supply will reach 150 million cubic feet within four or five weeks.

Incidentally, the government will get about $1 million out of the deal, some 75 percent of it from the 6 cents per thousand feet which TGT will pay and the rest from the saving of maintenance work which the company is to assume.

Krug disclosed that he "took the measure of the lines" during the coal strike last spring with a view to using them if the strike was not settled. Upon receipt of John L. Lewis' letter October 21 which indicated to him that another strike was imminent, he said, he inquired of Littlejohn if disposition of the Big Inch system couldn't be held up until the situation clarified.

At that time, Krug testified, Littlejohn was certain he would have accepted one of the 16 bids then before him, but later advised that he would hold the deal up until November 15. Committee hearings opened four days later, at which time Littlejohn announced rejection of all proposals. Krug said he had not suggested rejection of the bids.

John Bauer, spokesman for a group which bid on the lines, told the committee that the government should have adopted a policy of operating the lines in the public interest, but since it did not his group, for which Thurman Arnold, former head of the Justice Department anti-trust division, and Abe Fortas, former Undersecretary of the Interior, are counsel, proposed to perform such service which, he declared, was the only way in which eastern consumers could get cheaper supplies.

Refiners of the Middle West would suffer severely if the lines are retained in oil service, it was asserted by John Porter, president of the Texas Independent Producers and Royalty Owners Association, who said the coal states are unnecessarily alarmed about the encroachment of natural gas.

Admiral F. J. Horne, chairman of the Army-Navy Petroleum Board, challenged Littlejohn's statement that rejection of bids was due to a change in the position of the board respecting the use of the lines. The board, Horne said, believes that (1) the lines should be disposed of to industry for use; (2) no recommendation is made as to what industry should get them; (3) if disposed of for any purpose other than petroleum, provision should be made for reconversion in the event of an emergency, and (4) the expediency of reconversion in time of emergency should be determined on the basis of conditions then existing.

Former Surplus Property Administrator W. Stuart Symington, now Assistant Secretary of War for Air, whose "blue book" report of last January 4 was considered by Littlejohn a mandate to restrict the use of the lines to oil, denied that it foreclosed disposition of the system for gas or any other use. He said the blue book offered "no hindrance whatever" to sale or lease for any purpose, although he admitted it favored use for oil and specified only in the event such use was not possible should the lines be converted.

Former Secretary of the Interior Ickes told the committee that they could solve the problem of waste gas in West Texas. He paid his respect to everybody connected with the lines, even remotely, but bore down heavily on the bid of Big Inch Oil, Inc. Serious charges were leveled against Reconversion Director

Recording meter and run on the tie-in between TGT's main line and the 20-inch War Emergency line near the Texas-Louisiana line. This unit began metering relief gas to the Ohio area at 12:45 P.M. December 5, first flow of gas being expected to reach Ohio distribution points within 7 days from opening of control valve here.

FAVORED by weather, accessible crossings with present gas carriers, and taking advantage of most modern methods for speeding work, Tennessee Gas & Transmission Company has already tied in its own main line with the War Emergency 20-inch products line, and is rapidly displacing northeastward the low-pressure nitrogen previously filling the line.

A second tie-in will be made to bring in gas from the Lucky field, in Louisiana. The preliminary work on this is well under way, and deliveries from this source expected to augment the flow from TGT's own line at an early date. Indications are that the first of the Texas gas will reach the initial delivery point in Ohio not later than December 13.

The initial tie-in involved flying the necessary meter run and valve equipment to the junction near Newton, Texas. The tie-in is of 8-inch pipe. The two tie-ins will be relied on to fill the 20-inch and provide the initial flow of 50 million cubic feet per day. Work now being rushed to completion will tie the Harleton field, East Texas, to the 24-inch line just out of Longview, which with other probable connections will then carry both lines at maximum available throughput pressure.

Delivery will be to three junction points in Ohio, the first serving as feeder to Cincinnati and vicinity, the second providing additional gas to Toledo, Detroit and adjacent points, with the third, close to the point where the Big Inch lines cross into West Virginia, supplying additional gas to Cleveland, Akron and other industrial centers served by the same distributing system.

Operated or "powered" solely by pressures existing in the gas streams as they are released in the Big Inch system, the delivery is ideal from the gas point of view—no equipment, no compressor crews. It is expected that, barring difficulties not suspected at the time the line was placed in "dead storage," no trouble will occur to delay arrival of gas at the first take-off point. Water present in the lines is being removed from drips installed in the low spots or sags of the line. The nitrogen now in the line is being blown into the air at convenient points, removal of the nitrogen being effected by the advancing column of gas. Since each of the pump stations in the original setup was "floated" on the line, the station blanking gates will be used to prevent entry of the gas into the pump rooms, with the sectional block gates functioning in the same manner for the gas flow.

With the exception of temporary dehydration equipment for the Harleton and other East Texas gas sources, TGT will move in no equipment other than the actual pipe, valves and metering equipment necessary to regulate flow. TGT takes over, for the duration of its use of the lines, the maintenance work formerly carried out by Williams Bros. Co.

John R. Steelman, "confidant of President Truman and long-time friend of John L. Lewis," who, he suggested, should be asked "whether, a short time ago, he called the Administrator of WAA by telephone to suggest that if the inadequate bid for these pipe lines for the alleged transportation of oil were accepted, it would be helpful in settling the coal strike."

The TGT lease, he pointed out, may be extended a number of times, and it will have the effect of throwing the whole matter into Congress "where pressures from coal operators, coal miners and railroads, to say nothing of oil companies, may prove to be sufficient to make these pipe lines unavailable as permanent gas carriers."

Ickes suggested that the Attorney General scrutinize the lease from the standpoint of turning over to the company "the only line in the country that had possibilities as a competitor. Ickes said the company was tied up with a number of other companies, including Columbia Gas and Electric which, together with the Hope Pipe Line Company, was set up by Standard Oil Company (New Jersey).

Speaking of Krug's testimony that the lease had been made, Ickes said: "In my opinion, there was unfolded before this committee yesterday as choice a bit of slick politics as the country has been privileged to see for a long time."

Standard President Eugene Holman sent Ickes a quick telegram denying that the company had any interest in TGT or had any intention of acquiring. an interest in the pipe lines. Charles H. Smith, president of Big Inch Oil, Inc., sent him a long letter, denying that his bid for the lines was predicated on any "promotional" scheme.

Gardiner Symonds, TGT president, denied that his company was affiliated with Standard or any of the gas companies mentioned by Ickes, beyond the fact that some of them are customers.

Symonds disclosed that he first learned his company had been given an interim contract when Krug so testified. He was not unduly concerned about Ickes' suggestion that it violated the anti-trust laws, he explained, because all of the company's operations are under government control.

Expressing the opinion that the contract would not affect the permanent disposition of the lines, Symonds said that all estimates set a year as the minimum time in which they could be readied for gas service and, in view of the current and prospective materials outlook, it would be nearer two years. His company considered bidding for the lines, he added, but decided it should not seek new markets until it could adequately meet the demands of its present customers.

Steelman declined to appear before the committee, but in a letter denied that he had ever intervened in any manner in the problems involved in the disposition of the lines. He had one conversation with Littlejohn, during which he asked the administrator whether it would be possible to use the lines for gas, Steelman said, and Littlejohn explained he felt bound to follow the oil-preference recommendations in the Symington report.

Legality of any sale of the pipe lines for gas was questioned by James W.

Haley, attorney for the National Coal Association, who based his argument on provisions of the Surplus Property Act which prohibit the sale or lease of facilities in such a way as to disrupt the economy. The lines should be maintained in stand-by, he contended.

Apparently as an afterthought, Haley said the coal industry probably would not fight conversion of the lines if they were required to make up 75 percent of their load from flare gas.

The Interior Department's views, as presented by OGD's Acting Director Davies, call for sale for private operation, in gas service, on terms protecting the national safety and promoting the conservation of gas, just as quickly as possible.

Davies warned that the government must neither retain ownership of the lines nor attempt to operate them. If the lines were kept by the government, he said, then with equal justification "every line with which they might compete and every line with which such competing lines might compete should also be owned by the government, which would mean that the entire pipe line system east of the Rocky Mountains would be government-owned." Such an absorption, he added, would be "abhorrent," but government operation would be even more repugnant.

From the national standpoint, Davies continued, no one now can say that the Big Inch lines will be needed in the next emergency.

"The way to insure the availability of the Big Inch lines for overland carriage of oil above peacetime pipe line capacity is to keep them out of peacetime use as oil carriers," he declared.

Davies stressed the need and increasing demand for natural gas, which can be distributed only through pipe lines; the abundance of the fuel in the Southwest, and the gas now being wasted which could be moved through the Big Inch system.

Littlejohn's New Plan

The plan to ask the bidders informally to make new offers which he suggested November 19 has been dropped, and meetings have been scheduled this week with other interested agencies at which an agreement will be sought which will permit WAA to submit a supplemental report to Congress, ask for new bids placing all bidders on an equitable basis, and dispose of the lines at an early date for maximum cash.

Murray Named to Succeed Jester With Texas Body

William J. Murray, Jr., petroleum engineer of Houston, has been named railroad commissioner to succeed Governor-elect Beauford Jester. He will take over when Jester is inaugurated in January.

W. J. Murray, Jr.

Murray is a former commission employee, at one time heading the engineering department and is familiar with Texas oil fields, in which he has worked as a consultant for the past few years. During the war, Murray was with PAW in various posts.

He is a graduate petroleum engineer, University of Texas, 1936, worked as a consulting engineer until 1939 when he joined the commission staff in East Texas. During his earlier years he had oil field experience as tool dresser, driller and tool pusher in several West Texas fields.

Wants Natural Gas For East and Mid-West

Senator George D. Aiken of Vermont has called upon the new Congress to enact a strong program of anti-monopoly legislation which, among other things, would call for the use of natural gas for heating and fuel "not only to save the Eastern Seaboard from the stranglehold of the coal and railroad monopolies, but with equal force to supply industrial cities of the Middle West with vital energy."

O'Mahoney Group Report Expected in Two Weeks

A proposed blueprint for legislation to be enacted by Congress next year setting forth a national oil policy is expected to be released within the next two weeks in the final report of the Senate Special Petroleum Committee, now being reviewed by Chairman Joseph C. O'Mahoney and members of his group.

It is expected the report will recommend cooperation with other countries in dealing with problems of international oil but will maintain strongly that no world agreement be entered into which would handicap the foreign operations of American nationals.

The committee is expected also to take a conservative view of the claims that the United States will shortly run out of oil and that the nation will be prepared to undertake the production of synthetic fuels before our resources are depleted.

New Mexico Association Opposes More FPC Power

Opposition to the Federal Power Commission's expanding its activities to include the regulation of production and distribution of natural gas was voiced by the membership of the New Mexico Oil & Gas Association at the annual meeting held last week at Artesia. The association subscribes to views previously expressed by other oil and gas industry groups that natural gas regulation is a state function until the gas enters interstate commerce and that the Natural Gas Act should be amended to restrict FPC authority accordingly.

Previous endorsement of the Anglo-American oil agreement by the association was withdrawn in another resolution due to "the original agreement having been subjected to contradictory interpretations by the United States and British governments."

B. A. Hardey, president of IPAA, expressed satisfaction with the progress that has been made since V-J Day, in bringing the oil industry back upon a sound economic basis, but warned that the problems of the oil industry are recurring ones, and that their solution demands a unified front by the industry.

All officers and the executive committee were re-elected. Officers include Van S. Welch, president; Emery Carper, vice president; Harry Leonard, treasurer; and Jack M. Campbell, executive secretary.

NPC Agenda Committee

Members of the agenda committee of the National Petroleum Council will meet tomorrow to draw up the program for the NPC's next meeting January 21.

The committee will have a number of subjects to discuss, including the completion of statistics, future availability of military aircraft fuels and national oil policy, on which the council deferred action at its September meeting.

The January meeting may see finally the election of a permanent chairman and vice-chairman.

Two More Open Gulf Wells Seen

RELIABLE sources indicate that two new wildcat operations may presently be located in the Gulf of Mexico off the coast of South Louisiana, one by Humble Oil & Refining Company and the other by Kerr-McGee Oil Industries, Inc. Both companies have extensive lease holdings in the area and have been making geophysical surveys of this shallow-water region. Both companies have made application to the War Department, through the District Engineer's office in New Orleans, for permission to erect structures in the Gulf of Mexico.

Humble presently has 74,660 acres of offshore lands under lease from the State of Louisiana and Kerr-McGee has 45,000 acres.

This report follows closely a statement made two weeks ago by E. DeGolyer, consulting geologist, that at least 30 structures have been indicated by geophysical prospecting in the Gulf of Mexico within the 30-foot water depth contour from the Sabine River to the Mississippi River.

Magnolia Petroleum Company has the only active test in the Gulf at present. This test, located in open water six miles out from Point Au Fer field, is drilling below 11,040 feet. Magnolia holds more than a quarter million acres of offshore Louisiana leases.

Pacific Western's California Test Sets New Record for Deep Drilling

Pacific Western Oil Corp.'s National Royalties 1 in Kern County, California, is now the deepest well in the world. The old record of 16,655 feet, held by Phillips Petroleum Co.'s Schoeps 3 in Brazos County, Texas, was broken Monday when it was announced that drilling was proceeding below 16,656 feet.

At 16,668 feet, however, the drill pipe stuck near bottom. Good circulation has been maintained and it is hoped that the pipe may be freed and drilling resumed. This was the first trouble encountered during the entire drilling of the well.

Five records have been broken to date by National Royalties 1. It is the deepest well ever drilled in the fastest drilling time (16,656 feet in 216 days). It is the deepest well ever drilled by a contractor (Loffland Bros. Co.) and the greatest depth ever drilled without a fishing job. The deepest core ever recovered was taken between 16,538 and 16,5444 feet.

The contractor is furnishing the labor and the drill pipe. All other equipment has been supplied by the operator. The drill pipe string presently being used is a combination string consisting of 6347 feet of 18.10-pound 4½-inch and 10,103 feet of 15.5-pound 3½-inch. There are 205 feet of drill collars. The kelly accounts for 13 feet.

The well's objective is the Vedder sand which is found productive at several locations in Kern County. According to field reports the well topped the Wasco "A-2" zone at 16,100 feet, indicating that it was close to its objective at that point. It is understood, however, that if the drill pipe is freed, an attempt will be made to take the well on down to 17,000 feet.

O. M. Evans, vice president of Pacific Western Oil Corp., is in active charge of the drilling of the well. Hugh Smith is the superintendent, and Warren Craddock and Doug Marcell, petroleum engineers. Charles Porter is district geologist. Loffland's tool pushers on the well are Bob Blacker and Cotton Holder.

Last California well to hold a world's record was Standard Oil Company of California's KCL 20-13 in the South Coles Levee field of Kern County, which was drilled to 16,246 feet in 1944. The Texas record was set in August, 1945.

Navy and Standard Unable To Agree on Elk Hills

Navy and Standard Oil Company of California officials were at a stalemate last week over the division of the cost of maintaining the Elk Hills Naval Reserve in a state of readiness.

Having turned down a company proposal for revision of the contract so that the Navy would undertake to stand two thirds of the $600,000 a year cost. The Navy finds itself in the position of having a rejection of its counter-proposal to reverse the ratios so that the company stood the two-thirds.

Standard Vice President F. S. Bryant said acceptance of the Navy proposal would establish an undesirable precedent. The company will continue to bear the full expense of operating and maintaining the field for the present and, Bryant said, would renew its plea for relief at a later time.

API Public Relations Committee Listed by Boyd

A committee of the nation's oil men, headed by John M. Lovejoy, New York, president of the Seaboard Oil Corporation of Delaware, as chairman, has been named to direct the petroleum industry's public relations program.

The group will be a policy-making committee, under whose general supervision of the new public relations program will be financed, organized and conducted. Several sub-committees will be appointed by the chairman to deal with various phases of the proposed program, W. R. Boyd, Jr., president of the American Petroleum Institute, has announced.

Members of the general committee are:

East: R. H. Colley, The Atlantic Refining Company, Philadelphia; J. Frank Drake, Gulf Oil Corporation, Pittsburgh; Eugene Holman, Standard Oil Company (New Jersey), New York; Alexander Fraser, Shell Oil Company, Inc., New York; W. S. Hallanan, Plymouth Oil Company, Pittsburgh; B. Brewster Jennings, Socony Vacuum Oil Company, Inc., New York; W. A. Jones, Cities Service Company, New York; H. A. Logan, United Refining Company, Warren, Pa.; J. Howard Pew, Sun Oil Company, Philadelphia; W. S. S. Rodgers, The Texas Company, New York; Earle W. Webb, Ethyl Corporation, New York; Ralph T. Zook, Sloan & Zook, Bradford, Pa.

Mid-Continent: K. S. Adams, Phillips Petroleum Company, Bartlesville, Okla.; T. H. Barton, Lion Oil Company, El Dorado, Ark.; C. L. Henderson, Vickers Petroleum Co., Wichita, Kan.; B. L. Majewski, Deep Rock Oil Corporation, Chicago; W. G. Skelly, Skelly Oil Company, Tulsa; W. K. Warren, Warren Petroleum Corporation, Tulsa; L. S. Wescoat, The Pure Oil Company, Chicago; R. E. Wilson, Standard Oil Company (Indiana), Chicago.

Texas: J. L. Hamon, Cox & Hamon, Dallas; B. A. Hardey, Independent Petroleum Association of America, Shreveport, La.; Geo. A. Hill, Jr., Houston Oil Company of Texas, Houston; C. F. Roeser, Roeser & Pendleton, Inc., Fort Worth; H. C. Wiess, Humble Oil & Refining Company, Houston.

Rocky Mountains: W. H. Ferguson, Continental Oil Company, Denver; Henry D. Moyle, Wasatch Oil Refining Company, Salt Lake City; Paul Stock, Yale Petroleum Company, Cody, Wyo.

Pacific Coast: L. L. Aubert, Banklin Oil Company, Los Angeles; R. G. Follis, Standard Oil Company of California, San Francisco; W. F. Humphrey, Tide Water Associated Oil Company, San Francisco; A. C. Mattei, Honolulu Oil Corporation, Ltd., San Francisco; Ralph B. Lloyd, Lloyd Corporation, Ltd., Los Angeles; Reese H. Taylor, Union Oil Company of California, Los Angeles.

Further Oil Field Supply Troubles in Strike's Wake

Waning steel production and government-ordered freight embargoes gave unmistakable warning this week that oilfield operations will be badly retarded through the coming winter, at least.

Equipment and supply establishments, already some six months behind on orders and particularly bad off as regards tubular goods and structural shapes, are expected to feel the pinch of interrupted supplies immediately, as also will operators depending on near-future deliveries of goods on order.

New restrictions on rail freight, coming before the roads were able to work off the volume which piled up during the shipping strikes, will leave new loads to be handled when full traffic is resumed, further delaying the time when new equipment supplies will begin to reach the oil fields.

Crude Oil Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Dec. 7	Nov. 30
Alabama	1,000	1,000
Arkansas	73,500	73,350
California	872,300	871,400
Colorado	39,000	38,000
Florida	215	*
Illinois	201,300	205,200
Indiana	19,500	18,900
Kansas	249,550	275,500
Kentucky	30,000	30,000
Louisiana	402,785	401,600
North Louisiana	92,600	92,250
South Louisiana	310,185	309,350
Michigan	44,500	48,000
Mississippi	81,200	80,550
Missouri	100	100
Montana	24,400	23,300
Nebraska	750	750
New Mexico	102,715	101,000
New York	13,650	13,500
Ohio	8,400	7,900
Oklahoma	371,050	367,500
Pennsylvania	35,850	36,100
Tennessee	35	35
Texas	2,010,450	2,096,755
Tex. R. R. Comm. Districts:		
Dist. 1—S. Central	18,870	18,985
Dist. 2—Lower Gulf Coast	136,550	147,200
Dist. 3—Upper Gulf Coast	428,580	464,325
Dist. 4—S. West	211,300	226,325
Dist. 5—E. Central	34,930	36,835
Dist. 6—E. Texas Field	317,145	324,000
Dist. 6—Rest of N. East	100,190	105,075
Dist. 7-B—W. Central	34,615	35,300
Dist. 7-C—West	27,960	29,510
Dist. 8—West	500,800	507,250
Dist. 9—N. Central	118,490	121,400
Dist. 10—Panhandle	81,020	80,550
West Virginia	7,500	8,000
Wyoming	105,500	105,500
Total United States	4,695,250	4,803,940

* Wells shut-in.

Two Lines to Middle West from Texas Approved by Federal Power Commission

The Federal Power Commission has authorized two natural gas companies to undertake more than $75 million worth of work to expand their facilities from Texas to the Middle West.

One decision enables Michigan-Wisconsin Pipe Line Company to construct a 1069-mile 22 and 26-inch transmission pipe line from Hansford County, in the Texas portion of the Hugoton gas field, to the Austin storage field, Michigan, at a cost of $52,618,823. The company also was authorized to construct 892 miles of branch lines, to operate facilities in Austin and Reed City storage fields and to operate certain transmission lines and metering stations in Michigan owned by Michigan Consolidated Gas Company.

The $52 million represents initial cost of the project. Additional construction during the first four years will bring this Michigan-Wisconsin expenditure to $84 million.

In another order Panhandle Eastern Pipe Line Company, which had opposed the Michigan-Wisconsin application, was authorized to make additions to its Texas-Michigan system at a cost of $23,751,550. These additions, which will increase the capacity of the system from 393 to 473 million cubic feet daily, will include construction of 391 miles of 18 and 26-inch loop lines, five lateral lines to Michigan crossings, a field compressor station in Hansford County, Texas, and additions to existing compressor stations.

Michigan-Wisconsin Pipe Line Company is an affiliate of Michigan Consolidated Gas Company, a distributing company which now receives its gas from Panhandle Eastern Pipe Line Company.

Before the FPC decision, opinion was that only one of the applications would be approved. James B. Williams, counsel for the Michigan Public Service Commission, favored both proposals because the state of Michigan will feel more secure with two sources of supply.

FPC Is Told of Reserves At Mid-Continent Hearing

A market exists to justify the construction of additional pipe line facilitiles from Kansas and Oklahoma gas reserves to St. Paul, Minn., witnesses testified at a Federal Power Commission hearing in Kansas City last week.

The hearing, resumed after a 5-day recess, is in connection with Mid-Continent Gas Transmission Company's application to build a pipe line from Liberal, Kans., to St. Paul, via Kansas City. Cities Service Gas Company and Northern Natural Gas Company, now serving mid-western markets, are intervenors.

Walker T. Pound, conservation officer for the Oklahoma Corporation Commission, testified that Oklahoma had adequate reserves and that a market existed to justify the pipe line. William D. Weidlein, Mid-Continent president, said the maximum demand on the 26-inch, 836-mile line was estimated at 326 million cubic feet daily in the first year of operation, rising to 464,690,000 cubic feet in the fifth year.

Charles H. Keplinger, Tulsa petroleum engineer, testified that reserves contained in 120,000 acres owned by the Peerless Gas and Oil Company, suppliers to Mid-Continent, would be 1200 billion cubic feet. He said the Peerless acreage could produce, when developed, 150 million cubic feet daily.

A Russell Young of J. F. Pritchard & Company, engineering firm which has made detailed studies of the cost of construction of the proposed line, presented estimates of how more than $72 million could be invested in the line by 1949.

Following the Mid-Continent case, FPC will hear testimony on applications of Cities Service and Northern Natural to extend and expand their present facilities.

Storage Authorized

Michigan Gas Storage Company has been authorized by the FPC to proceed with its plan for developing facilities for gas storage in the Interfield and Cranberry Lake Gas fields in Michigan at a cost of $20,107,549. The company proposes to receive gas from Panhandle-Eastern Pipe Line Company during the summer for storage against winter needs, planning eventually to lay aside 15 billion cubic feet each year.

Gasoline Plant Opened With Carthage Ceremony

The Carthage field's new $3½ million gasoline condensing plant of the Chicago Corporation and associates, including W. C. Feazel and N. V. Kinsey of Shreveport, and Clyde Alexander and associates of Corsicana, Texas, was dedicated December 3. The program also included celebration of the third anniversary of the discovery of the west extension of the Carthage gas field.

Feazel and Kinsey were honored as discoverers of the field through dual completion of the H. C. Jordan 1. The well was the forerunner of a drilling program which made the Carthage field one of the largest gas areas in the world.

The Chicago Corporation's plant operates as a unit with 33 wells producing from dual depths. Daily capacity is 150 million cubic feet.

Atlantic Completes Extension

Atlantic Pipe Line Company has completed the installation of a 48-mile 8-inch extension from the Block 31 field, Crane County, to its West Texas terminal and main line station near Midland. The field gravity gathering system acquired from Texas-New Mexico Pipe Line Company has been expanded to permit the segregation of the Devonian and Ellenburger production.

Atlantic Refining Company has posted a gravity scale price ranging up to $1.70 per barrel for 40-gravity and above for the premium quality Ellenburger oil. Atlantic has erected two 80,000-barrel storage tanks adjacent to its Block 31 field booster station.

Pipe Line to Denison from Cumberland Field Listed

Lone Star Gas Company has authorized the construction of a 21-mile 10-inch natural gas line from the Cumberland field, Marshall County, Okla., to Denison, Texas, where it will intercept a 10-inch unit of its system. Pipe is expected for this unit next March.

The company is currently taking a portion of the gas residue from Warren Oil Corporation's natural gasoline plant at Cumberland through a line that connects with its system at Durant, Okla.

Houston Oil Production In East Texas Said Sold

Houston Oil Company, owner of 1200 barrels of daily production in the East Texas field, has contracted to sell this oil for two years effective January 1 to the Crown Central Petroleum Corporation, which has a refinery near Houston.

Crown Central recently negotiated a contract to purchase Rudco Oil and Gas Company's 490 barrels daily output in the East Texas field, using the common carrier facilities of Pan American Pipe Line Company in making deliveries to the Houston refinery. A premium of 7½ cents per barrel above the posted price is reported to be involved in these two deals.

FPC Chicago Hearings

The FPC has announced that hearings will open in Chicago, December 10 on the applications of Natural Gas Pipeline Company, Texoma Natural Gas Company and Chicago District Pipe Line Company for additional facilities which will cost the first two $23,238,613 and the third company $750,000.

Proposed rate schedules filed by Memphis Natural Gas Company, which would increase its rates by $240,000 annually, have been suspended by the commission on the protests of customers of the company, pending investigation.

To Sell Royalty Oil

Bids for the first sale of government royalty oil under the O'Mahoney Act giving small refiners with inadequate supplies a preference will be opened by the Interior Department December 17.

Oil offered is from unitized areas in the Kettleman North Dome field, California, and the Salt Creek field, Wyoming, the oil from each field being offered in units of one-half or as a whole. In 1945, the government received approximately 785,000 barrels of royalty oil from the Kettleman unit and 390,700 barrels from Salt Creek. Average gravity of each was 37°.

Texas Petroleum Company Test Opens First Field in Upper Magdalena Area

The Texas Petroleum Company has opened a new oil field for the Magdalena Valley area in Colombia, Velasquez 1, on the Teran-Guaguaqui private fee property having been completed last week through casing perforations between 6900 and 7100 feet. Although no accurate gauge can be taken until more storage is available, it is estimated to be capable of producing between 300 and 400 barrels daily through a ¼-inch choke on the tubing.

On early tests the well showed gas-oil ratio of 400- and 600/1. Gravity of the crude was 27.2 degrees corrected. During the short tests the well was flowed through various chokes from ¼-inch to ½-inch, and it flowed from a rate just over 300 barrels, to as much as 411 barrels daily. Lower formations were tested before this completion. A test with casing perforated at 7265-7275 feet showed only about 25 barrels of 26-gravity oil daily.

Meanwhile there are two favorable sands above the completion point which have not been tested. One sand is at 6300 feet, and another at 6700 feet. All are in the Tertiary section which has extended all the way to basement at total depth just above 8500 feet.

The well is shut in and its production will be used temporarily as fuel for further development. A derrick has been constructed for Velasquez 2, located 2275 feet south of the discovery, and the rig is being moved. The new area marks the first discovery of commercial potentiality in the Upper Magdalena Valley. This is the first wildcat drilled by The Texas Petroleum Company in Colombia.

The company has started operations at Tablon 1, on a concession in the Department of Bolivar, east of Monteria and southwest of Magangue, and is drilling below 1000 feet.

Official Changes Listed In Trinidad's Oil Setup

W. N. Foster, formerly assistant Petroleum Technologist with the Trinidad Mines Department at San Fernando, is officially taking charge of the newly expanded Petroleum Department. He succeeds R. S. MacKilligan who has retired.

The Petroleum Department, originally the chief function of the Mines Department under the Inspector of Mines, has been divorced from other minerals activities and has been expanded to give fuller technological service. Foster's post is to be known as "Petroleum Technologist," and the department has been reorganized with additional assistant technologists, an assistant geologist, and a consulting geologist. The San Fernando field office will be staffed with five technical men instead of two.

Foster comes from San Fernando where he has been assistant technologist since late 1936. Prior to inspectorate staff service he had been in the production division of Apex Trinidad Oilfields since 1929, coming to Apex Trinidad from a year's experience with Compania Petrolera Lobitos in Peru. From 1923 to 1928 he was in the drilling and producing divisions of Trinidad Central Oilfields, which position he took immediately after finishing at Cambridge.

I. S. Rutherford is acting assistant petroleum technologist at San Fernando, and a second assistant technologist is to be sent from England. The position of assistant geologist has not been filled.

Dr. H. Kugler, of Trinidad Leaseholds, chief geologist for Central Mining and Investment Corporation, has become geological consultant for the petroleum department.

Colombian Gulf Company's Test Reports Slight Show

Colombian Gulf Oil Company's Sardinata 1, wildcat test in Antioquia, Middle Magadalena Valley, Colombia, is drilling and coring below 7200 feet after having picked up some shows of oil.

The wildcat has been finding sand sections showing light oil from about 6800 feet to the present depth. However, the are not too extensive and are extremely nonporous, having considerable amount of clay mixed with the sand. The saturations are said to be spotty and not thought by the company to be capable of commercial production. So far no tests have been made and none will be attempted purely on the basis of showings to date.

The concession on which the wildcat is being drilled was purchased by Gulf from Compania Regalias de Petroleo, a Colombian Company, owned by local capital, which retained a small overriding operating interest.

Gulf's Zahmino 1, in the same area, now is drilling below 5000 feet.

Rig Reported Ready for Spain's First Wildcat

The drilling rig for Spain's first full-scale wildcat oil test is being set up and it should spud in shortly. This American-made medium-duty power rig has a capacity of approximately 8000 feet.

Socony-Vacuum Oil Company has a 50-50 interest with the Spanish firm of Compania Espanola de Petroleos Scientificas Investigaciones, S. A., and is furnishing the technical personnel and drilling equipment.

The Oliana prospect, site of the first well, is in the Province of Lerida, 60 miles northwest of Barcelona in extreme northeastern Spain. It is situated on the Segre River in the Ebro Basin at an altitude of approximately 1500 feet. As presently mapped, it is an anticlinal structure on which the Lower Tertiary is exposed so that sedimentary possibilities within the range of the available drilling equipment will include the Tertiary and possibly older beds. No core drilling has been done.

Floresanto Test Shut Down For Special Mud Materials

Sinu Oil Company's Floresanto 10, deep test in the Sinu field of northwestern Colombia, is reported drilling below 4161 feet.

This deep well, which follows completion of a number of shallow holes, has been giving trouble with heaving shale, and reports say it will shut down until special mud materials are moved in. Silicate mud helped to conquer a heaving shale condition in the Tubara area, and will be tried at Sinu. Deeper producing zones at Sinu is important, since its two producers are shallow depths and of limited producing capacity.

Elsewhere in Colombia, Socony-Vacuum Oil Company has started drilling its second test in the Las Monas area where its La Salina 1 was recently completed as a small producer. The No. 2 is now drilling at 756 feet, near the shallow formations of the discovery well.

Socony's Cantagallo 10, key well in the northern portion of the Cantagallo field, which drilled to 6503 feet, set casing at 6000 feet, is testing. It is said to have had a very good sand section.

New Pemex Head Favors No Outside Oil Capital

Antonio J. Bermudez, former mayor of Cuidad Juarez and now a senator in the Mexican congress, last week was named director general of Pemex, the government-owned petroleum monopoly in Mexico. Bermudez succeeds Efrain Buenrostro.

As head of Pemex, Bermudez will seek harmony between the government oil industry and its workers—a key to expanded Mexican industrialization promised by President Aleman.

The Mexican oil industry during the past several months has been beset by frequent work stoppages and strikes which have tied up movement of cargoes, jeopardized operations of many industries.

Bermudez in a statement declared the Mexican oil industry would be developed without the aid of foreign capital.

He also outlined an increased production program designed to overcome the labor disturbances which have plagued Mexican oil and transportation operations. This would be financed by Pemex income and, failing sufficient profits for required expansion, he said, Mexican capital, both private and public, would be called on for assistance.

Pantepec Deal Ok'd

Pantepec Oil Company of Venezuela's acquisition of leases on about 4 million acres of potential oil land in Florida has been approved by its stockholders.

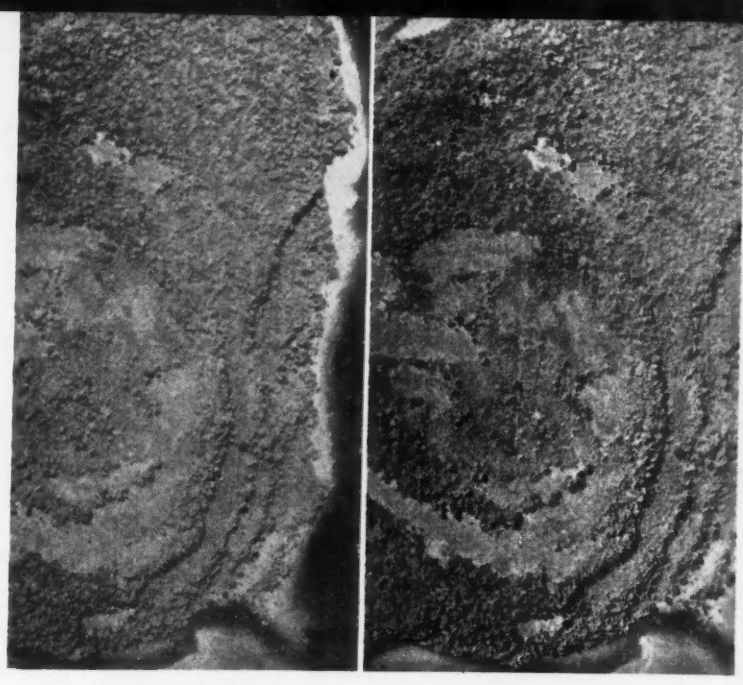
Most of the stockholders voting also favored ratification of two agreements with Compagnie Francaise des Petroles, covering a four-year pact for Pantepec to sell all its Venezuelan oil production to the French company, with an option by the latter to purchase half of Pantepec's Venezuelan interests, plus one-fourth of the stock of the new Florida concern.

Photogeology AIDS OIL EXPLORATION

Part 2 (Conclusion)

Aerial Photographs

By LAURENCE BRUNDALL
Vice President, Geophoto Services, Inc., Denver



Non-stereoscopic inspection might lead the layman to interpret the concentric vegetation pattern above as a sructural dome. The photographs are a stereo pair taken over Guadalcanal and the concentric banding is due to heavy tree growth on the cliffs of a series of raised, flat coral benches. Some expert photographic interpreters are able to view stereo pairs in the third dimension with their unaided eyes. To practice unaided stereo vision on the above pair place a large white card upright between the photos. View the pair from a distance of about 18 inches and attempt to fuse the two images into a central three dimensional model. This can often be accomplished by gazing through the photos as if one were looking at an object several hundred feet away and then gradually bringing the fused image into sharp focus.

BECAUSE of the great amount of current interest in the applications of aerial photographs to the petroleum industry, some pertinent data on their characteristics and the elements of photogrammetry are given.

Figure 2 shows the various type of aerial photographs. High obliques (A) are often used in conjunction with aerial photographs to give a "bird's eye" view of a great expanse of terrain. The Canadian government has used this type in mapping large portions of Canada. Since it is almost impossible to keep a camera in a true vertical position in a moving airplane, the term vertical (C) is still used even though the camera may have been tilted several degrees. A series of overlapping vertical photographs affords the best coverage for photogeologic studies. The U. S. Geological Survey uses a five-lens camera (D); the central lens is vertical and the others are inclined and grouped around it. The resulting photograph resembles a Maltese cross with a central vertical portion and four oblique views around it. The oblique portions are rectified into vertical views to achieve the result of a single vertical view of a large area. These photographs are ideal for mapping purposes but are not favored for detailed photogeological work because of the small scales obtained and the fact that the process does not give full stereoscopic coverage.

Mosaics (E) are vertical picture maps of areas larger than that which can be covered by a single vertical photograph. The most accurate type of mosaic is the controlled mosaic in which adjustments are made to insure uniform scale and proper orientation and to tie the picture map in with suitable ground control. An uncontrolled mosaic is made by matching uncorrected photographs along their borders or central portions and is generally subject to large errors of scale and displacement. Considerable skill is required to lay a mosaic correctly so that the portion used of each photograph will match with the portion of adjacent photographs. The match lines are usually made along roads or natural features such as stream courses or ridges. Since abrupt match lines sometimes look like faults or marked differences in bedding, it would render mosaics more efficient for photogeological work if the match lines were made to conform with the geological expression of the photos.

A photo-index is an uncontrolled mosaic of all the vertical photographs of an area utilizing the entire area of each photograph. These are often useful as rough picture maps in which the geology as determined from the contact prints can be spotted. They also show the position of individual photographs in a flight line and the relationship of the various flight lines to one another.

Scale

The scale of an aerial photograph (see Figure 3) is an extremely important factor in photogeological work. This scale may be expressed as a representative fraction (R. F.). For example RF: $\frac{1}{12,000}$ means that one unit of measurement on the photograph equals 12,000 of the same units on the ground.

A photograph whose R. F. is 1/1,000 is ten times larger in scale than a photograph having a R. F. of 1/10,000.

Scale also can be expressed by the statement of direct distance conversion, e. g., 1 inch = 1000 feet.

Most of the government photographs in the U. S. have been taken at a scale of 1/20,000 and in some cases the scale is 1/31,680 or even 1/40,000. The writer considers 1/20,000 (1 inch = approximately 1600 feet) the smallest scale on which it is possible to do any detailed photogeologic work. In many areas even this scale will be too small and accurate

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LAURENCE BRUNDALL received his degree in geology at the University of Chicago in 1935. After completing some post-graduate work at the same institution, he spent seven years as an exploration petroleum geologist in Texas and Louisiana. In 1942 he was commissioned a Naval photographic intelligence officer and during the war he was assigned to the Joint Intelligence Center, Hawaii, and to Photographic Squadron 3 in the Marshall and Gilbert Islands. He also served with the Amphibious Air Support Training Command at Coronado, Calif., where he was an instructor in map reading and photo intelligence.

Upon entering inactive duty in November, 1945, he and three other photographic intelligence officers formed Geophoto Services, Inc., in Denver. The company specializes in photogeological evaluation studies for petroleum exploration. The original group of three geologists and a cartographer has been enlarged to include a staff of five geologists with associated map-making and photogrammetric departments.

work would require a scale in the neighborhood of 1/10,000.

One fact which has mitigated against more prevalent use of larger scale photographs is that the commercial price of photography becomes very high in the larger scale range. It is hoped that increased use of aerial photographs and the specification of larger scale by government agencies and oil companies will lower the cost.

Types of Cameras

Aerial cameras are of the single lens and multi-lens types. The former type gine Beechcraft planes which will enable is favored for photogeological assignments. Contact prints 9 by 9 inches or 7 by 9 inches are best for detailed stereoscopic examination. A variety of focal lengths is available in the lenses used.

The longer focal length lenses are preferred since the resulting prints have less edge displacement than the shorter focal length (wide angle) lenses. However, the longer the focal length of the lens used the higher it is necessary to fly to procure any given scale. For instance, to get a scale of 1/20,000 with a six-inch focal length lens the plane must fly 10,000 feet above the terrain. To get the same scale with a 12-inch focal length lens it will be necessary to fly 20,000 feet above the terrain. (See Figure 4.) Heretofore the photographic planes used by commercial aerial photographic companies have not been able to fly high enough to permit use of long focal length lenses. Several of these companies have not been able to fly high enough to permit use of long focal length lenses. Several of these companies have recently acquired some Army P-38 pursuit ships and twin engine Beechcraft planes which will enable the use of the longer focal length lenses.

Among the multi-lens cameras the war-developed trimetrogon system of photography is an important contribution to reconnaissance mapping, but because of the very small scales involved (about 1/40,000) the photographs will be useful only for rough reconnaissance photogeological studies.

The trimetrogon camera in reality consists of three separate cameras equipped with six-inch wide-angle lenses. The central camera is vertical and is flanked by the other two which are tilted at an agle of 60 degrees. The resulting series of photographs consists of a central vertical strip and two opposing oblique runs which include the horizon and a small portion of the vertical strip. Maps are prepared by restituting the oblique runs into the vertical component. Trimetrogon was developed to eliminate a large number of single vertical runs over enemy terrain. The method is of little value even for geological reconnaissance work unless complete vertical coverage is obtained, and in this event the oblique runs can be used for preliminary planning operations.

Wartime photographic intelligence officers who were geologists in civilian life found many interesting geological phenomena on combat aerial photographs. The above photo shows a dome structure but it would be useless to drill for oil there. The central portion is an igneous intrusion and the locality is Formosa. Note the rice paddies on the flat ground around the dome.

In our opinion, the ideal camera setup for photogeological work would be a long focal length lens for large-scale contact prints supplemented with a small-scale mosaic. Thus, the large-scale prints can be used for detailed work and the mosaic for posting photogeologic information and for regional study.

Another wartime camera development, the Sonne strip camera, has no shutter. The exposure is controlled by the width of an aperture across which the film moves continuously. In this manner a single strip negative of an elongate area is obtained. By a double lens arrangement it is possible to secure stereoscopic strip coverage. This camera was designed to give large-scale coverage of such features as enemy beach lines and trench systems. The most obvious peacetime applications of the Sonne camera would be for detailed photography of elongate features such as pipe line routes, canals, power lines and highways.

Kodacolor reversal film was extensively used during the war but its relatively high cost has so far hindered its peacetime use. It is hoped that manufacturing improvements will allow greater applications of the film to photogeology. It should be extremely valuable in areas of variegated rock outcrops.

Photographing an Area

A perfect vertical photograph is still a theoretical goal in aerial photography and it will remain so as long as the control of the photo plane is subject to human error. Some efforts have been made in the development of automatic machines which will compensate against such factors as the tip and tilt of the plane, crab caused by winds, and changes in the flying altitude.

Figure 4 illustrates the method of photographing an area to obtain prints satisfactory for photogeological work.

The time and season of photography is an important factor which is often overlooked. The middle of the day is best for photogeological purposes because heavy morning and evening shadows are avoided. In many instances such shadows have obscured important outcrops. During the winter months when the shadows are longer this is an

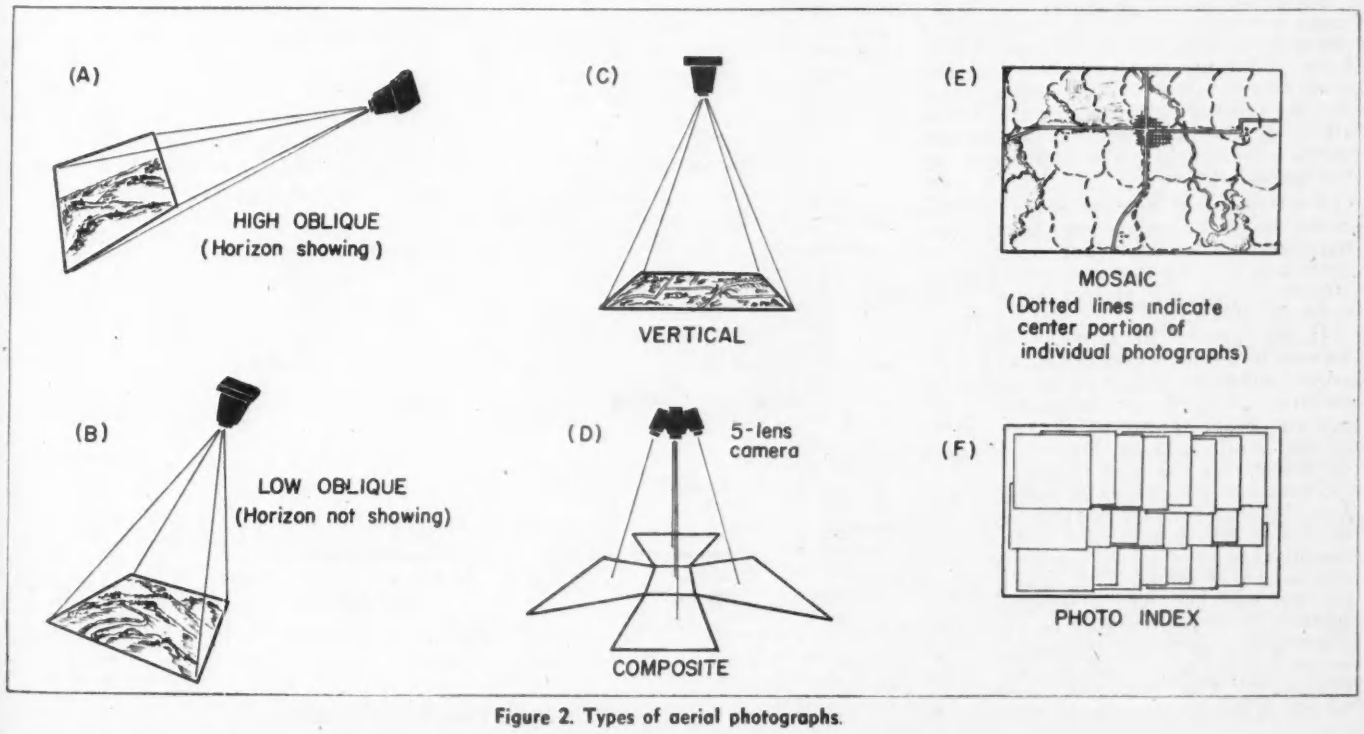


Figure 2. Types of aerial photographs.

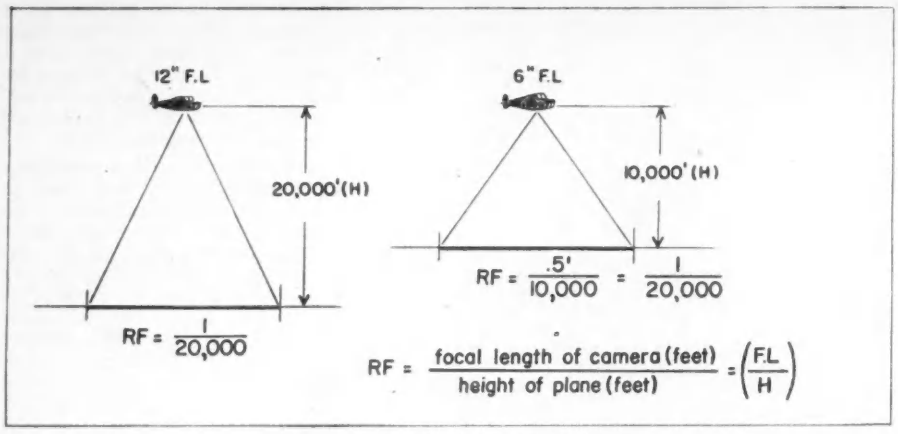


Figure 3. Aerial photograph scales.

important consideration. Of course, completely snow-covered terrain will afford no diagnostic photogeologic information, but scattered drifts against rock ledges often outline the outcrops in great detail.

In areas which are covered by deciduous forests, late fall or early spring are good seasons for photography since the ground will not be obscured by the leaves.

Stereoscopy

The accurate photogeological evaluation of an area is based on the phenomenon of stereoscopy. A simplified explanation is shown in Figure 5.

The old-fashioned parlor stereoscope will be well known to all. Old-timers will remember the startling three-dimensional effects obtained by inserting a card of Niagara Falls. Aerial stereoscopy works on the same idea except that instead of a double lens camera on the ground a single lens vertical aerial camera is used. Another difference is that the ground stereoscopic camera has a lens separation about equal to that between the average person's eyes, whereas the separation in the aerial stereoscopic view is achieved by the distance between exposures, which may amount to several thousand feet.

Relief perception through the stereoscope is dependent on three factors: (a) two photographs of the same area taken from different camera positions, (b) proper orientation of the photographs, and (c) normal binocular vision. The inability of most laymen to realize proper stereo vision is usually influenced by the second factor.

Some form of a stereoscope is generally used for relief perception from photographs, but with long practice experts are able to dispense with the instrument and see perfect stereo with their unaided eyes.

If the photos of a stereo pair are viewed in the incorrect order, a pseudoscopic effect is obtained in which all features are seen in reverse depth perception. Hills appear as cavities in the ground and streams flowing in deep valleys show up as high ridges.

There are two types of stereoscopes. For detailed photogeological work the refraction type is preferred since it gives an enlarged view of the terrain with increased relief effect. This type consists of two matched lenses which are adjustable to fit the distance between each observer's eyes. Most refraction stereoscope lenses magnify about two or 2½ diameters. The reflection stereoscope, which utilizes a system of mirrors, allows a greater field of view and the photographs can be examined without overlapping. This type is useful in preliminary planning and reconnaissance work.

A photogeologist without a stereoscope is like a bricklayer without a trowel. He will be able to derive some information from single prints or mosaics, but the third dimensional view enables him to evaluate an area in much greater detail than can be accomplished from the flat picture map.

There are several processes which enable stereoscopic depth perception without the use of a stereoscope. Of these, vectographs are easiest to use and afford greatest clarity. Vectographs are formed by processing the two prints of a stereo pair on one negative so that each print transmits polarized light at right angles to its companion. The prints are superimposed on a metallic backing and when viewed through Polaroid glasses a three-dimensional image is seen. Vectographs were extensively used during the war in briefing combat teams. Their big advantage is that they make the three-dimensional stereo view easily recognizable by the non-expert. In the realm of photogeology their value will be restricted to the exhibition of areas before groups of people not accustomed to using stereoscopes so that all members of the group will be able to see the third dimensional image simultaneously.

Photogrammetry

Photogrammetry (the science of preparing accurate maps from and making precise measurements on photographs) is finding increasing use in photogeology. A description of the map-making techniques is outside the scope of this paper, but those procedures which concern the measurement of elevations from aerial photographs are important in the structural geological maps and they are briefly described here.

There are several exceedingly complicated and expensive machines for making accurate topographic maps from aerial photographs. The most commonly used of these instruments are the Fairchild Multiplex which utilizes a series of projectors to build up a three-dimensional model in space, and the Aero Service Corporation Brock Process in which the aerial photographs are obtained on glass plates and the contouring is done by stereometers which can be adjusted to eliminate tip and tilt. The chief concern of the photogeologist, however, is to obtain a series of spot elevations on key outcrops. The Fairchild stereo-comparagraphs (see Figure 6) or the Abrams Contour Finder are comparatively inexpensive instruments which serve the purpose.

Measurement of height with these instruments is a function of angular parallactic displacement. A simple example is in the determination of the height of a smokestack. The distance between the base of the smokestack which appears in each photograph of a stereo pair which have been correctly oriented will be greater than the distance measured between the top of the smokestack. The difference in readings is mathematically converted to an expression of height. The parallactic displacement is measured by means of a micrometer device to within .01 mm. An important source of error enters into the operation of the machine if the photographs are distorted by tip or tilt. If these are within three degrees the errors can be compensated for by the establishment of suitable ground control elevation points and the construction of correction graphs from the ground control.

Acknowledgements

The writer gratefully acknowledges the assistance of his partners in Geophoto Services, Inc., A. R. Wasem, V. Zay Smith, Robert McMillan and John Herman. The latter annotated the photographs and prepared the diagrams. Valuable suggestions were offered by Prof. W. S. Levings of the Colorado School of Mines.

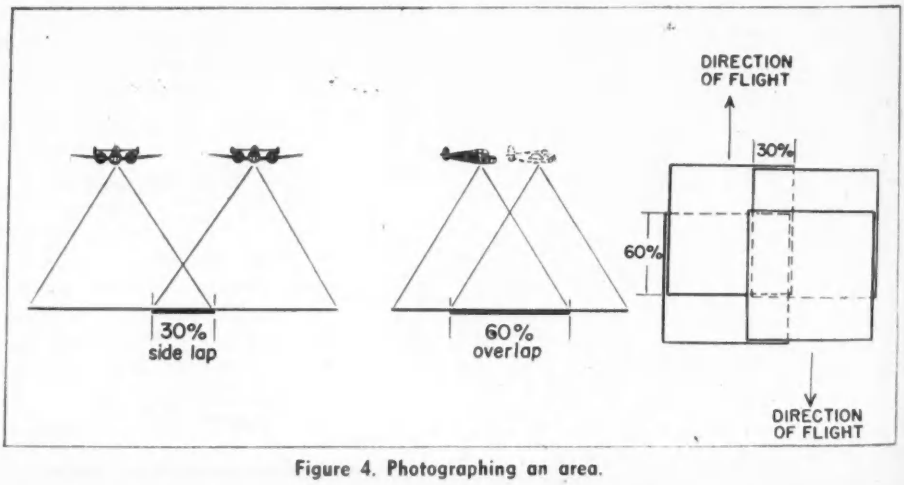


Figure 4. Photographing an area.

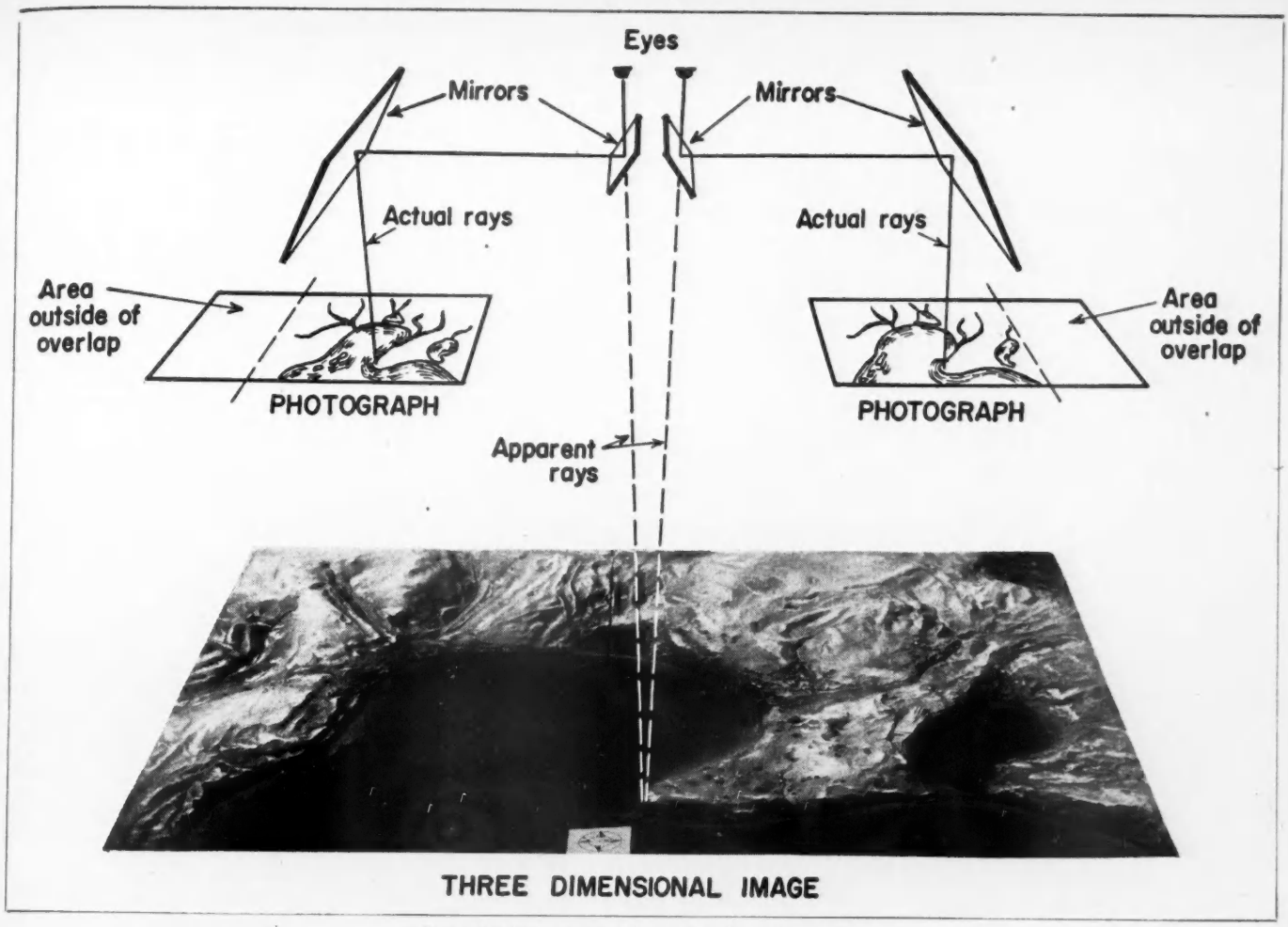


Figure 5. Stereoscopy with a reflecting stereoscope.

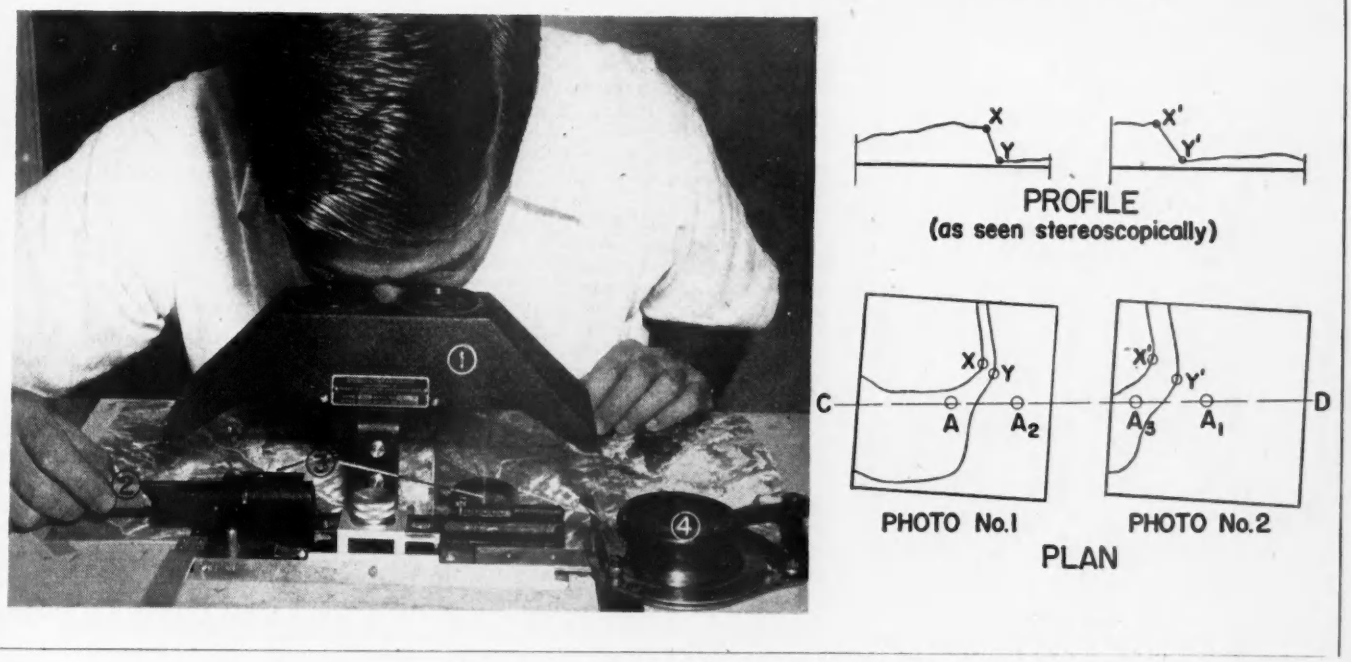


Figure 6. Principles of height determination.

A: Principal point of Photo 1. (Center point of photo if tip and tilt are absent.)

A_1: Principal point of Photo 2.

A_2: Principal point of Photo 2 located on Photo 1.

A_3: Principal point of Photo 1 located on Photo 2.

Distance A to A_2, or A_1 to A_2: stereo base which varies according to the type of stereoscope used.

Correct orientation of the stereo pair is obtained by aligning the principal points along the line CD and by separating A and A_3 the correct stereo base distance.

X and Y: top and base of nearly vertical cliff as expressed on Photo 1. X_1 and Y_1: same points located on Photo 2.

Distance X to X_1 is less than the distance Y to Y_1 because X and X_1 being higher in elevation are radially displaced a greater distance from A and A_1 respectively. The difference between X to X_1 and Y to Y_1 is called parallactic displacement and this can be mathematically converted to the height of the cliff.

BECAUSE of the considerable cooling resulting from the expansion of gas, many petroleum reservoirs can be located by temperature measurements made in wells filled only partly with mud.

Temperature

By HUBERT GUYOD

Well Logging Consultant, Houston

THE nature of the fluids contained in reservoirs is usually difficult to determine in situ even when modern logging methods are applied. On the other hand, the problem may frequently be solved satisfactorily when small quantities of these fluids are permitted to enter the bore hole.

A number of properties can be successfully investigated for this determination, among which the temperature of the fluids occupies a leading place.

Although temperature measurements can solve a number of fluid problems they have, like any other method, certain limitations which either prohibit their general use, or make difficult the interpretation of the data. These limitations are as follows:

1. The temperature changes observed in a bore hole are not always caused by fluid intrusions only.

2. Temperature anomalies are a transient phenomenon which is frequently of short duration.

3. Oil which does not release an appreciable amount of free gas has approximately the same thermal properties as water, and usually cannot be distinguished from it.

Two main problems can be frequently solved by temperature measurements in drill holes:

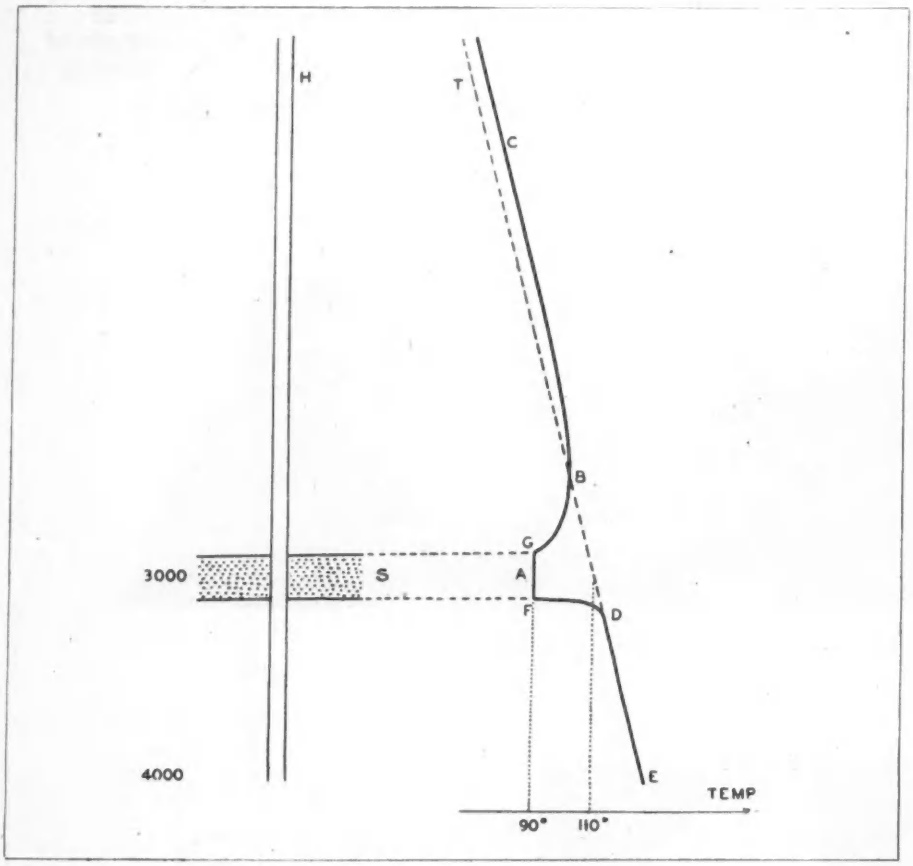
A. Location of petroleum reservoirs in wells which do not contain drilling fluid.

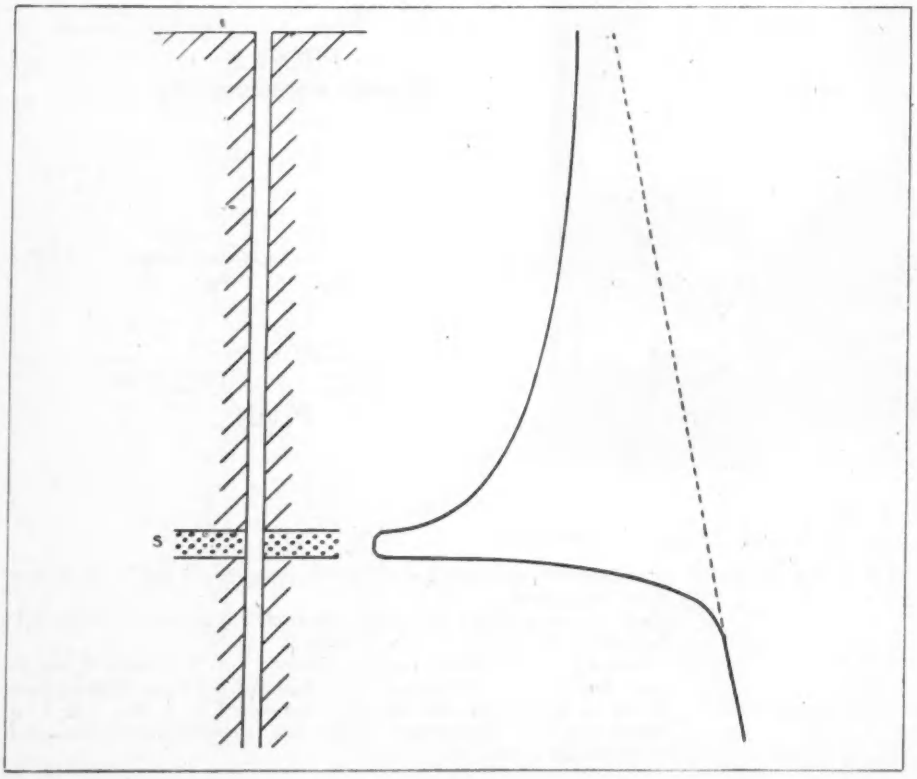
B. Production problems.

A few examples of these applications will be discussed.

Gas Reservoirs

In rotary wells the density of the drilling fluid is usually such that the pressure of the mud at any point of the hole is greater than the formation pressure. Therefore, there is generally no fluid intrusion from the beds penetrated into





Sixth of a series of seven articles, which are based upon research work sponsored by Halliburton Oil Well Cementing Company. Preceding installments have been published in The Oil Weekly of October 21 and 28, November 4 and 11, and December 2.

Figure 6-1 (top). Temperature anomaly produced by gas entry (hypothetical).

Figure 6-2 (bottom). Depth-temperature graph in a well producing a large quantity of gas from a high-pressure reservoir (hypothetical).

WELL LOGGING

Part 6

Wells Not in Thermal Equilibrium

the bore. On the other hand, in wells drilled by the cable-tool method there is an almost continual influx of fluids into the hole. When the well traverses a gas sand, an appreciable quantity of gas is released, and its expansion is accompanied by a temperature decrease. Evidently the temperature is minimum where the greatest expansion takes place, namely directly opposite the reservoir.

Referring to Figure 6-1, H is a cable-tool hole 4000 feet deep, for example, having penetrated a gas sand S at 3000 feet. Suppose this sand was sealed while drilling proceeded from 3000 to 4000 feet and that the hole contained only air. A temperature graph T made under this condition would show that the temperature steadily increases with depth, and in first approximation it can be assumed that graph T is substantially a straight line indicating a temperature of 110° at 3000 feet. Suppose now that a certain quantity of gas is released from the sand and that a recording thermometer is constantly held in this mass of gas. The pressure of the gas, while escaping, will drop considerably and the gas temperature will decrease from 110° to perhaps 90° (section A of graph). Because of its low density, the gas will rise in the hole while finishing to expand to atmospheric pressure. Since its temperature is much less than that of the formations, it will cool the latter while ascending, and in turn will be warmed by them, until such depth is reached that a temperature equilibrium is attained (point B). Above point B the gas, while rising, comes in contact with formations which are colder than itself and there is an exchange of heat in the opposite direction. Because of thermal lag, above point B the gas remains warmer than the formation with which it is in contact.

Below S there is no great movement of gas (because of the difference in density), and heat is transferred almost only by diffusion and conduction. The resulting temperature distribution is shown by arc ADE.

A complete depth-temperature graph is therefore as shown by curve CBADE showing two breaks, F and G, at the boundaries of the reservoir.

The magnitude of the temperature anomaly at S and the length of arc GB depend primarily upon the pressure drop at the level of the reservoir and upon the quantity of gas released per unit time. When these two factors have large values, the temperature drop is considerable and the temperature of the gas at the top of the well may be much less than the ground temperature at that level. (Figure 6-2.)

If there is another gas reservoir S' above S, the resulting anomaly is superimposed on that described above. For example, if the quantity of gas released by S' is much less than that released by S, the temperature graph is basically as shown on Figure 6-3. In the opposite case, the log is more or less as indicated on Figure 6-4, all other factors remaining the same.

If the gas escapes from a single fissure (fractured limestone, for example), the temperature anomaly is extended over a shorter distance (Figure 6-5).

Oil Reservoirs

When an oil reservoir is tapped, part of the gas dissolved comes out of solution and escapes also into the well. The resulting thermal anomaly is evidently almost identical to that which would be obtained if the same quantity of gas had escaped alone from the reservoir.

However, because the quantity of gas dissolved in oil is relatively small, the cooling due to an inflow of oil is less than that produced by free gas, all other factors remaining the same. This difference is of considerable practical importance because it frequently permits determining the approximate base of the gas in wells which are not filled with drilling fluid, whereby correct completion for low gas-oil ratio is possible. There are, however, no fast rules for the solution of this problem and usually some local experience is necessary. Also, the correlation of temperature readings with other data is profitable.

Referring to Figure 6-6 for example, the largest temperature anomalies are situated above 3310. Pipe was set at 3320 and the well came in with a small GOR.

There are cases, unfortunately, where the gas-oil contact cannot be determined from temperature data. This is especially true when the petroleum is found in fractured reservoirs. The erratic nature of the formation is probably responsible for this condition. Figure 6-7 represents a temperature log obtained in a West Texas well having penetrated a fractured limestone. From other data it is known that the gas-oil contact is in the neighborhood of 4880. The log fails to show any significant anomaly near this point.

Figures 6-8, 6-9 and 6-10 are early temperature graphs obtained by, or under the direction of, C. E. Van Orstrand. Although only spot readings were taken, the graphs illustrate well some of the remarks offered above.

In wells filled partly with mud or water, it is more difficult to determine positively the position of petroleum reservoirs because the pressure differential, and therefore the temperature anomaly, is less. If the fluid level is sufficiently high, there is no oil or gas entry and the temperature changes exhibited by the log are usually not related to the petroleum reservoirs.

Production Problems

To suppress or reduce the amount of water which is produced from many oil wells it is necessary first to locate the

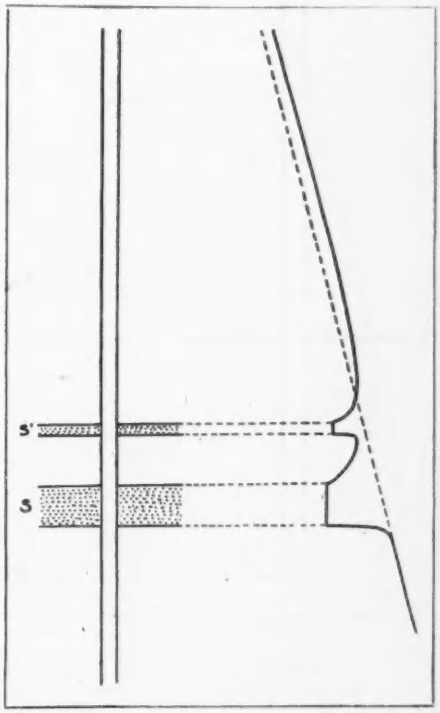


Figure 6-3. Depth-temperature graph in a cable tool well having penetrated two gas sands (hypothetical).

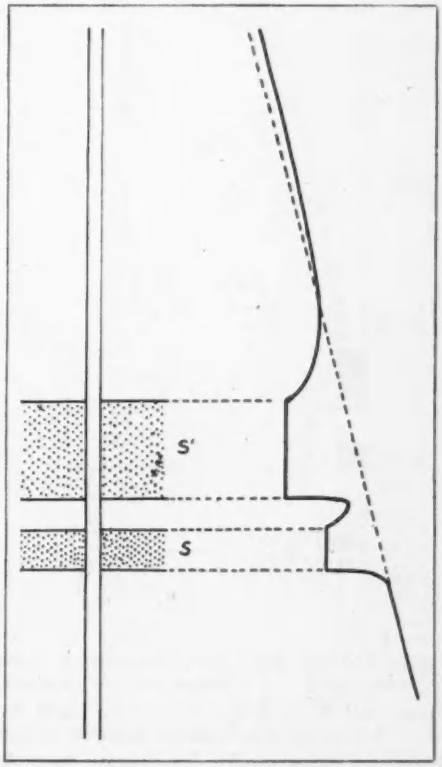
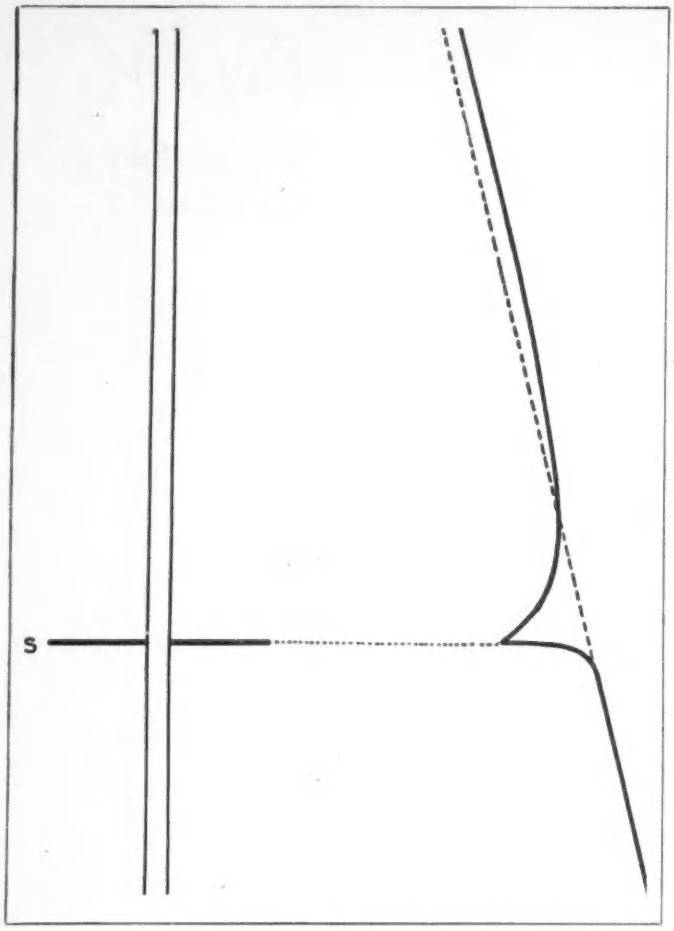
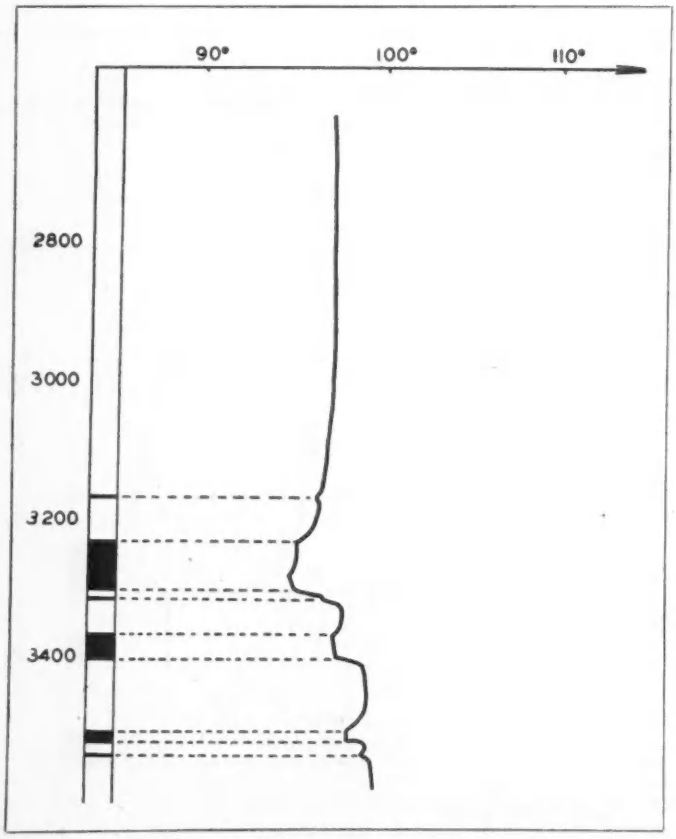
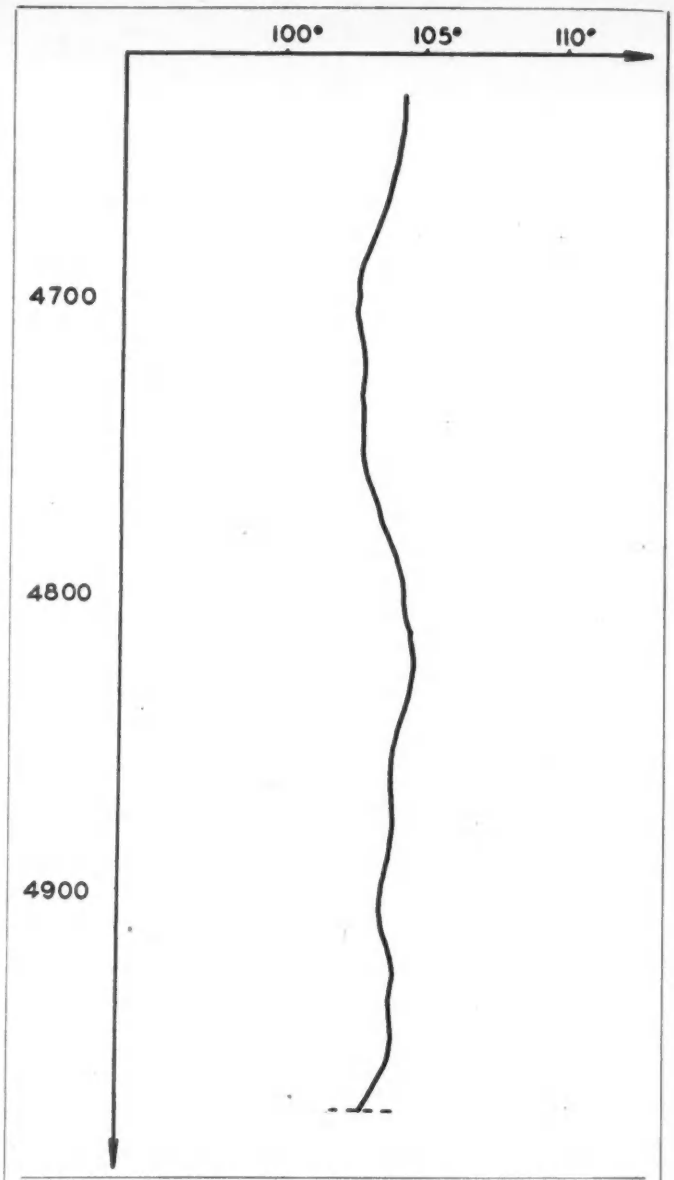


Figure 6-4. Depth-temperature graph in a cable tool well having penetrated two gas sands (hypothetical).







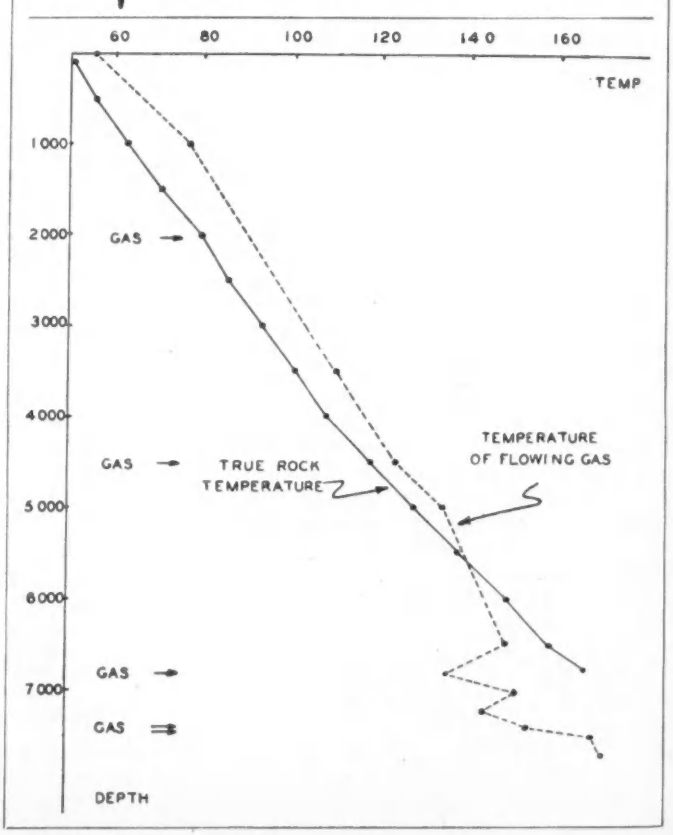


Figure 6-5 (top left). Depth-temperature graph in a cable tool well having penetrated a single fracture containing gas (hypothetical).

Figure 6-6 (lower left). Temperature graph from a West Texas well having penetrated porous dolomite containing oil and gas.

Figure 6-7 (upper right). Temperature graph from a West Texas well having penetrated a fractured lime section containing oil and gas.

Figure 6-8 (lower right). Depth-temperature graph in a flowing well.

After Van Orstrand, 1930. Courtesy API

point of entry of water. Temperature measurements frequently permit solving the problem. Basically, the method consists in setting up proper thermal conditions in the well in order to produce relatively large temperature anomalies from the flow of water. This conditioning of the hole is usually achieved by circulating mud or gas at such a temperature that good contrast is obtained from the water. In a few rare instances the thermal state of the well is such that no preliminary conditioning is necessary.

Referring, for example, to Figure 6-11, the oil production from the well shown to the left stopped gradually while large quantities of water were produced. A temperature survey made while the well was flowing showed an upward migration of fluid (water) from the bottom of the lower set of perforations. A second survey made after the well was shut in disclosed that this fluid was entering the upper set of perforations at 5510, feet and presumably was flooding the oil sand situated at this level. Pressure traverses confirmed the foregoing interpretation. Plugging back to 6150 feet shut off the water.

Another case of successful water location is shown on Figure 6-12. The well had casing to 2937 feet and open hole from the shoe to 3026 feet. Circulation was made with 9.4-pound mud to clean out bottom, the pipes were pulled out, and a temperature survey obtained (run No. 1). The well was then bailed and bailing continued until the fluid level stopped going down. Approximately 600 lineal feet of fluid was removed. Run No. 2 was made and a sharp increase in temperature was indicated on bottom. The well was again bailed until the fluid level could not be reduced (approximately 60 lineal feet of fluid was removed). Run No. 3 made thereafter confirmed the results of run No. 2. A cement plug was placed in the bottom of the well and the water shut off.

Figure 6-13 represents two temperature runs made to locate the point of gas entry in an oil well. The first survey (plain line) was made while the well was flowing through casing, with tubing shut in. The graph indicates that the greater part of the gas is coming from 9280 feet with a tapering off to bottom. The shutin survey shows the temperature drifting towards the normal geothermal gradient, indicating that no formation was taking gas appreciably.

Interpretation of Data

The use of temperature measurements in wells will become more valuable when the interpretation of the data becomes more positive. Good progress is being made by building up a background of knowledge from the many surveys made in wells under various conditions in different areas of this country, and by coordinating the results with all other information available, in particular pressure traverses.

Acknowledgment

The writer is greatly indebted to C. R. Date, Dale Company, Los Angeles, for the logs and data contributed to the present article.

(Additional figures on following page.)

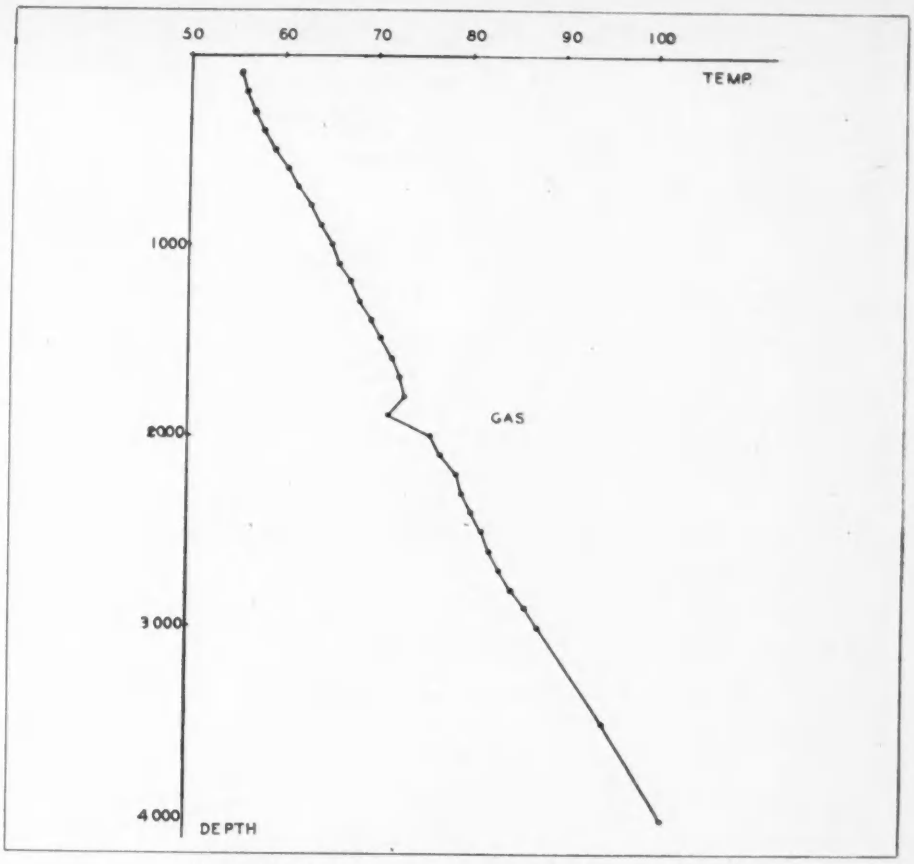


Figure 6-9. Depth-temperature graph of a West Virginia well.
After Van Orstrand, 1918. Courtesy West Virginia Geological Survey

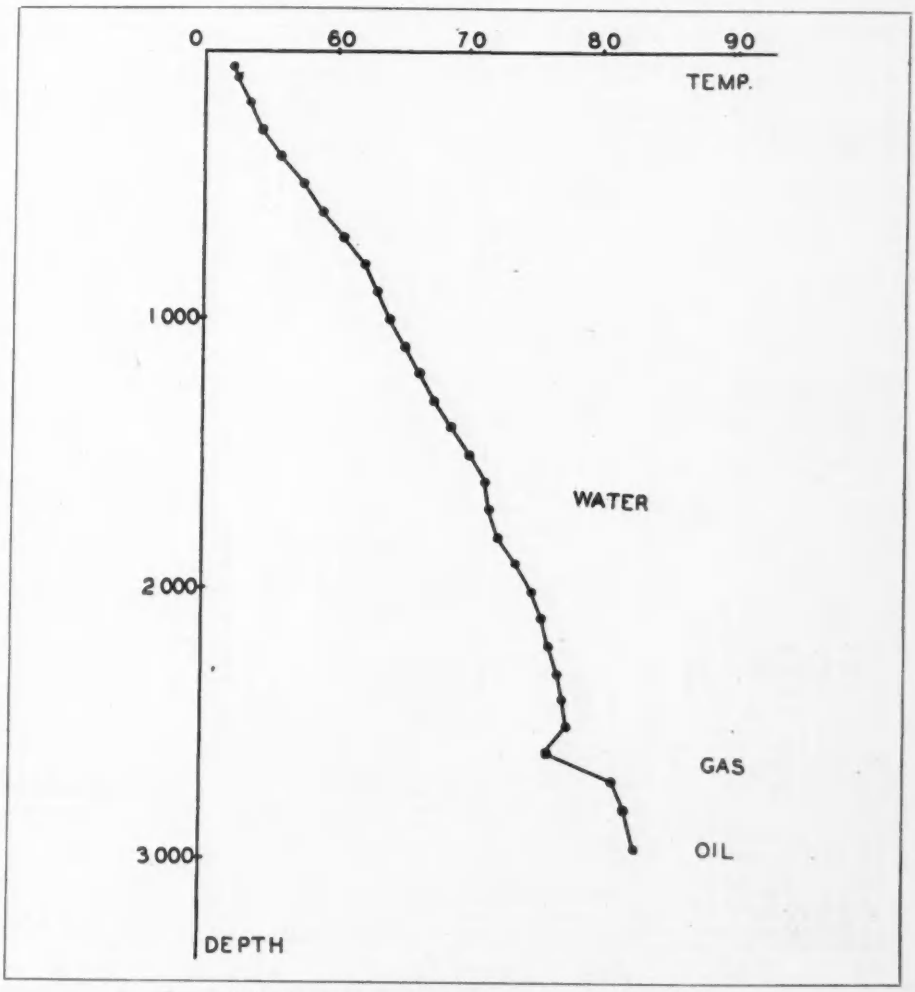


Figure 6-10. Depth-temperature graph of a West Virginia well.
After Van Orstrand, 1918. Courtesy West Virginia Geological Survey

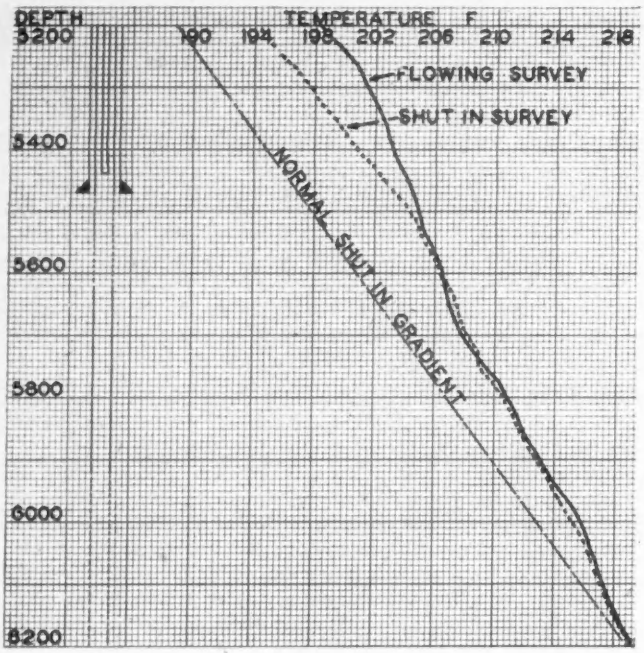


Figure 6-11. Investigation of water migration in a California well.

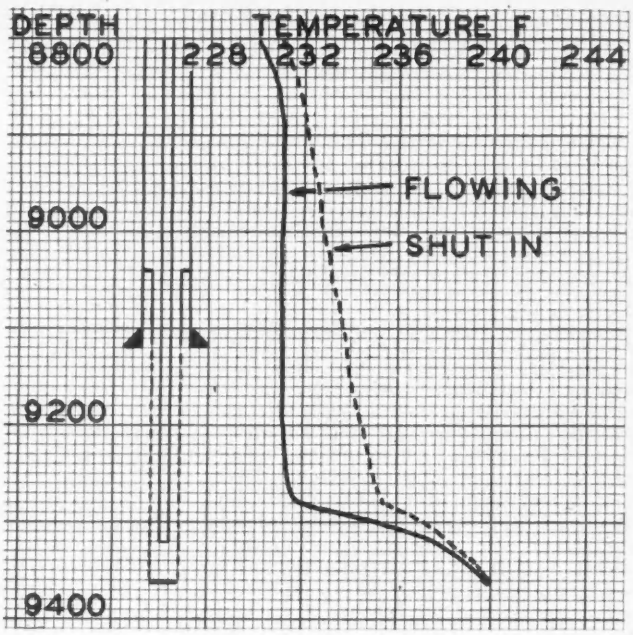


Figure 6-13. Location of a point of gas entry in a California well.

Courtesy Dale Company

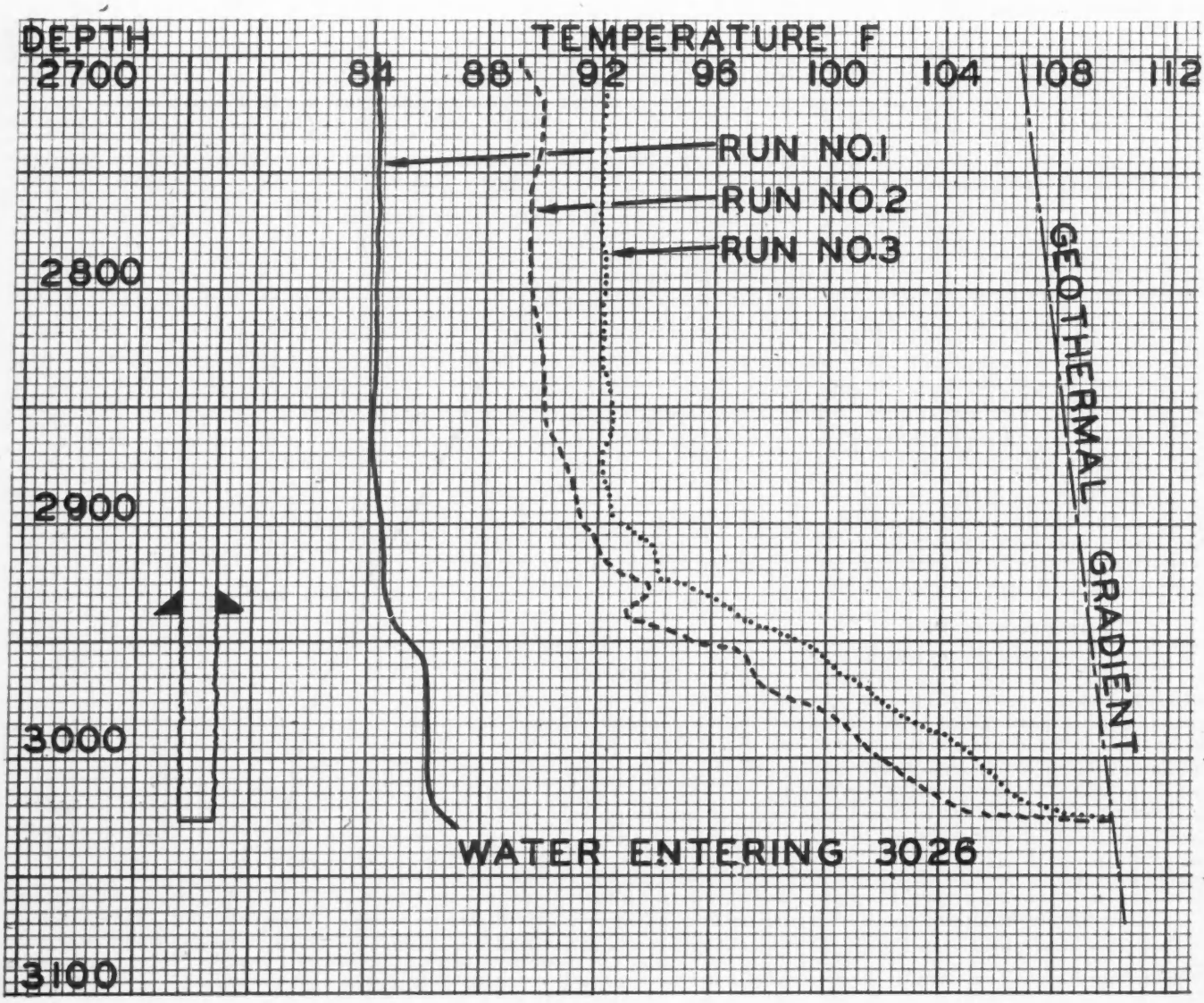
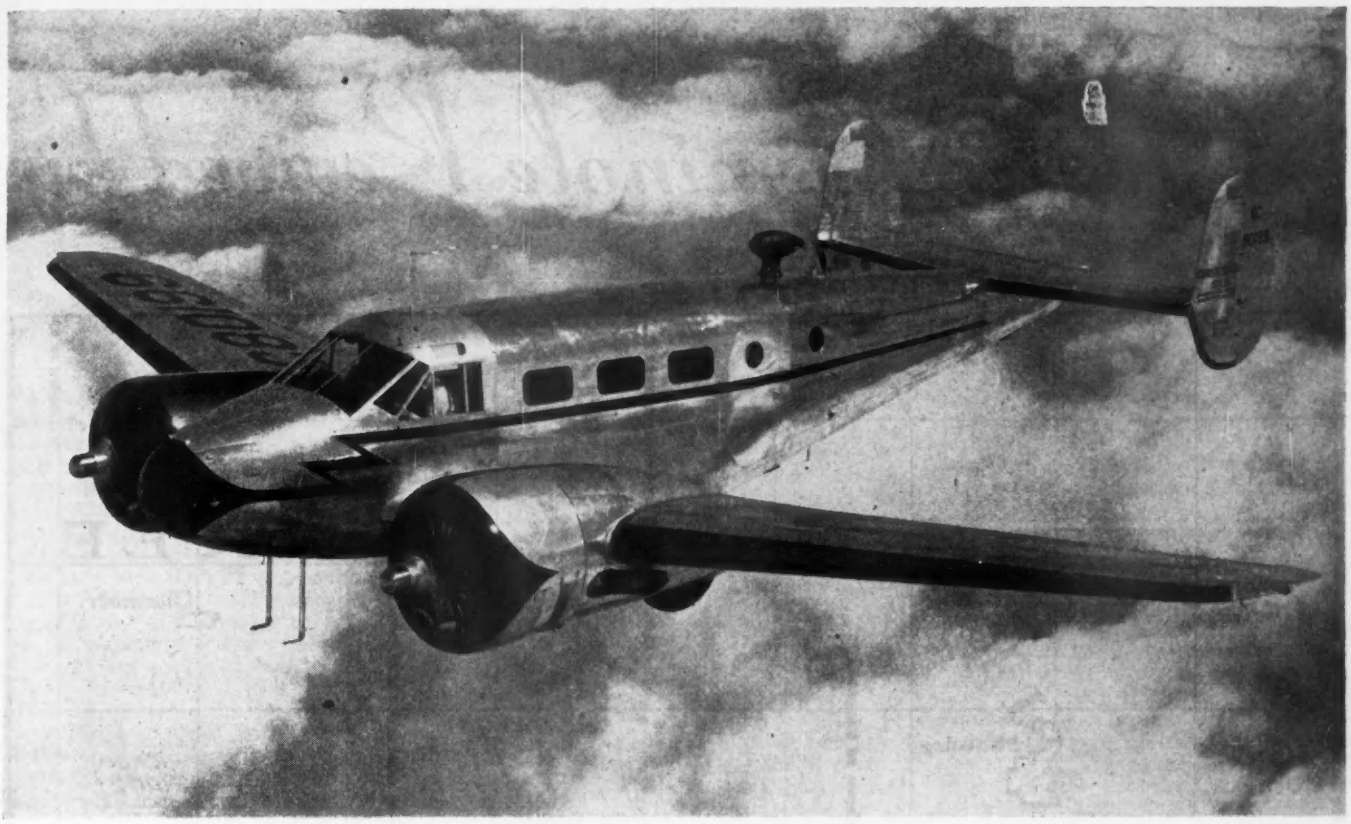


Figure 6-12. Location of a water flow in a California well.

Courtesy Dale Company



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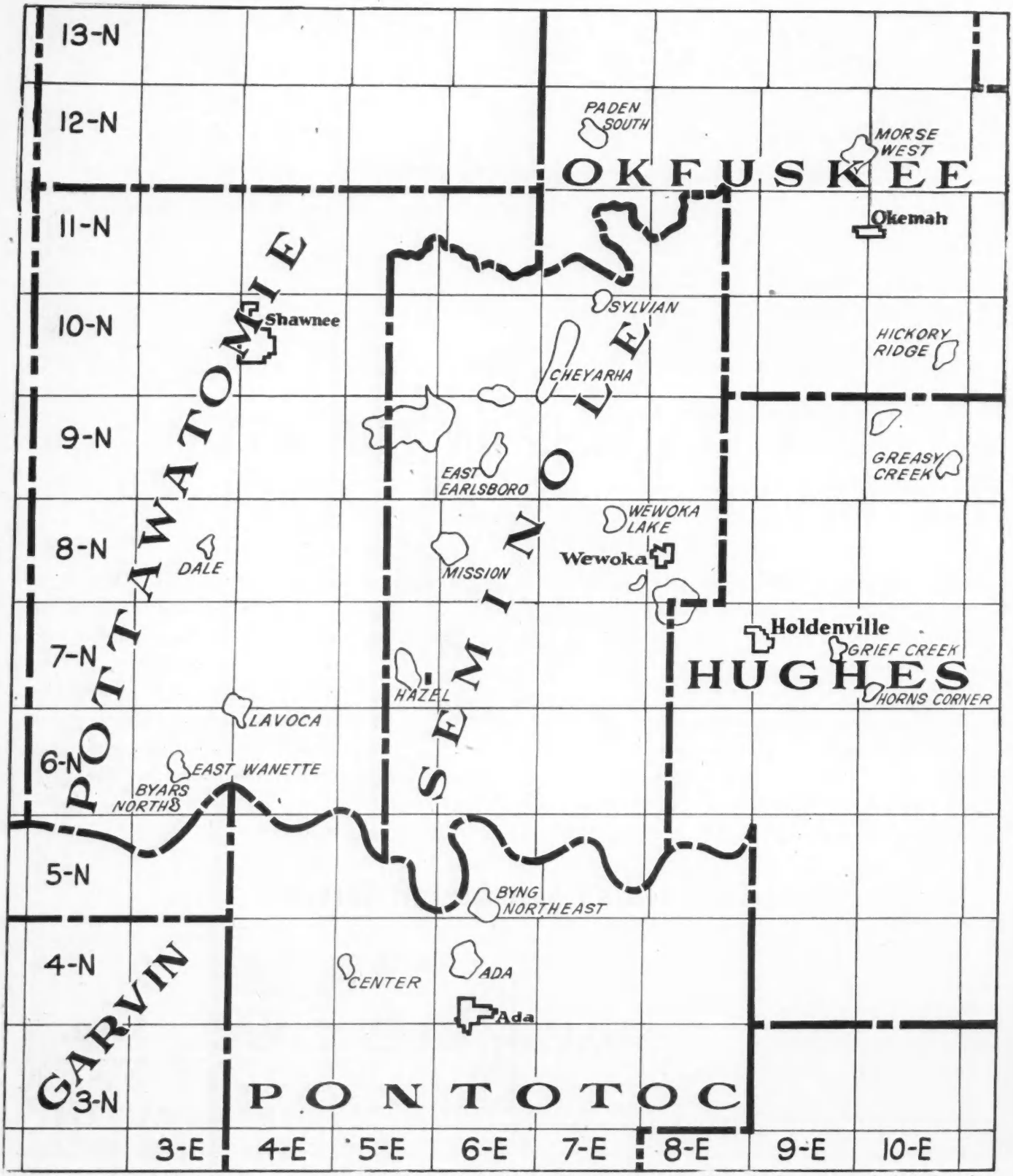
Greater Seminole Revived by



Plotted on the map are 20 of the most active pools of the Greater Seminole area. They include new pools, pools where new pay horizons have been discovered, and pools that have received extensions during the revival of the region in the past 18 months.

MANY SMALL POOLS

By WILLIAM P. STERNE
Staff Writer

A REVIVAL of drilling activity in the Greater Seminole area of Oklahoma, a region that has long been one of the state's most productive regions, has resulted in approximately 100 discoveries or field extensions during the past 18 months, in sectors that were thought previously to have been exhausted. This development has given rise to the belief that the area will continue as one of the major contributors to the state's crude and gas production for years to come, despite the small size of the structures.

Intense play in the region began in late 1945, with trend, flank and workover drilling. These activities have met with a remarkably high degree of success, and have brought several counties back into the production foreground.

Naturally, the normal rate of decline in production for Greater Seminole, which is composed of Seminole County and portions of Pottawatomie, Pontotoc, Hughes and Okfuskee counties, has continued despite these new activities; however, this rate has been retarded sufficiently to make the explorations of the old area worth while.

Greater Seminole is a huge region which some geologists claim includes portions of Lincoln County, to the north, and extends as far southwest as the tips of McClain and Garvin counties.

Through this recent period of development, the stratigraphic trap has been the general geological feature of the area.

Opened in 1925

The Seminole pool, first opened in 1925, was at that time confined to a small area of Seminole County. Further exploration and drilling gradually extended this area into the five-county region which is known now as Greater Seminole.

The primary aim of all drillers in the early days of development was to drill as quickly as possible to the Wilcox sand in the Ordivician System, where production had been proven previously. In their haste, many promising formations in the shallower Pennsylvanian System were passed up. Despite the showings in these formations (which, according to logs of many wells, were in some instances exceptionally good) these zones were sealed off, so that no time would be lost in getting to the contracted depth in the Wilcox.

Too, the methods in earlier days of taking cores and samples were crude compared with systems now in use. It probably will never be known just how many good producing horizons were tabulated on well logs as other types of formations, and passed up as "dry."

With many years of good production from the Wilcox, the area began a decline which increased until Greater Seminole took a second place position in Oklahoma's production picture. It was then that those holding interests in the area became definitely concerned.

A remedy would have to be found in order to rejuvenate the area; subsequently, it was agreed that the area should be thoroughly studied by seismic crews and local geologists. As a result of this intense study, the area has since become one of the most seismographed regions in the nation.

Geologists began examining back records of old wells, and a general picture formed in their minds that productivity could be secured on many of them by going back and testing formations that were previously passed up. They felt that there were certain conditions prevalent that could result in production in shallow sands of the area, and set to work to prove their theories.

Best Producing Sands

Virtually all discoveries in the area within the past 18 months have resulted from stratigraphic traps and faulted conditions. These sub-surface conditions have proven exceptionally productive from several Pennsylvanian sands, among them the following: Booch, which averages approximately 2500 feet in depth; Cromwell, depth of which averages 3000 feet; Senora, which is encountered at approximately 2000 feet; Calvin, 1500 feet; and Gilcrease, 2700 feet.

Seminole County has been the leader in activity during this revival. Several pools have been opened in various shallow pays, including the Cheyarha pool, a stratigraphic trap on the north side of the East Seminole pool; the Wewoka Lake pool, also a stratigraphic trap, and the Sylvan pool, which has a ten-acre spacing rule.

Pontotoc, Hughes and Okfuskee counties, as well as the eastern portion of Pottawatomie County, have all been active.

While most workover operations (and for that matter exploratory work in the area as a whole) are being carried out by independent operators, several major companies are now active in the region. Included is Gulf Oil Corporation, which recently opened the Garcreek pool, with production from the Gilcrease sand. The discovery well of this field was Remaklus 1, SW SW NW 17-10n-7e, one mile west of the old East Haney field. It was completed for a flow of 1101 barrels of oil per day from Gilcrease at 3725-80 feet. Three other wells are now being drilled in the immediate vicinity.

In order to get a general picture of recent activities in this vast area, work has been separated into individual counties, so that development can be more readily visualized.

Seminole County

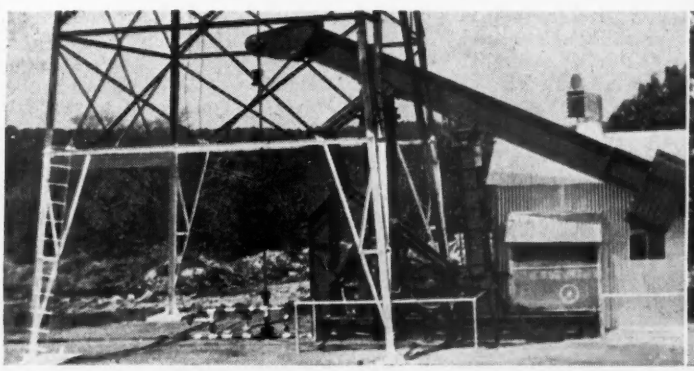
The leader in the recent revival of the Greater Seminole area has made important contributions to Oklahoma's production. Following is a small portion of activities that have occurred:

Hazel Pool: Situated in 24-7n-5e, this area produces from the Calvin sand. Above this formation, however, is a water sand, separated from the Calvin by shale. Wells have recently been completed in this pool for from 60 to 300 barrels of oil per day. In order to get production from the relatively small Calvin formation, operators have had to case off the upper sand. If this were not done, only water would have been recovered. This is one example of how this productive formation may have been passed up by earlier drillers because it appeared that a whole series of formations would produce only water.

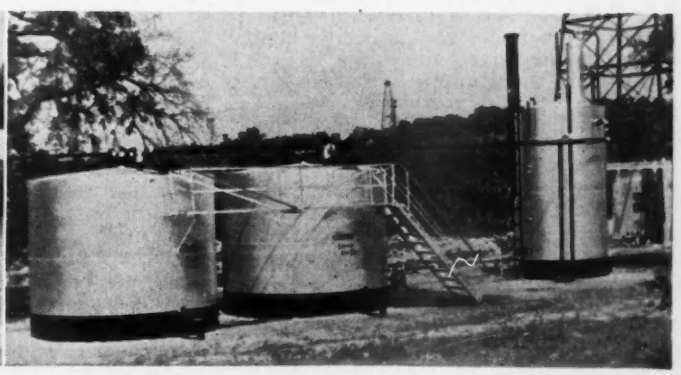
East Earlsboro: Mealy-Wolfe Drilling Company and the Winona Oil Company have been most active in this area. Their activities are centered about the northeast corner of 27-9n-5e. The field produces from the Earlsboro sand at approximately 3500 feet, with average wells flowing 150 barrels per day.

Mission Pool: Gulf extended the Mission Pool with Seminole Nation 10, SW NW SW 5-8n-6e. This well is being completed in the Wilcox sand from 4275-79 feet. This extension has substantiated the belief of a number of geologists and oil operators that the old producing horizon is still capable of paying off in certain areas.

Sancho Area: Vickers Petroleum Company and Mealy-Wolfe are attempting to extend this area, and at present are drilling the Stigall 1, SW NE NE 7-8n-7e.



Above is Mealy-Wolfe Drilling Company et al's Harjoge 1 in 8-7n-7e, Seminole County, a discovery during the revival of the Greater Seminole area.



Storage tanks used to handle oil of Mealy-Wolfe et al's Harjoge 1, Seminole County.

Northeast Lima Area: Most active in this vicinity is the Texola Drilling Company, now drilling two wells in the area. Production is anticipated from the Cromwell sand.

Wewoka Lake: This pool, a stratigraphic trap, is being developed by Manahan Oil Company, Magnolia Petroleum Company, Kingery & Patterson, Ligon & Sons, and R. H. Pierce. They have been the most active in this area, which produces from the Booch sand, at approximately 3100 feet.

East Wewoka: R. W. Brown and associates recently completed Fore 1, SW NE NW 16-8n-8e, for a well from the Hunton lime at 3988-99 feet. On a swab test the well made 20 barrels of oil per hour. Several wildcats, and prospective extensioners to the pool proper, are being drilled east and southeast.

Seminole City: The Pure Oil Company and Smith-Horton Drilling Company have been the most active. Each completed several Calvin sand wells for approximately 35 barrels per day on pump, from around 2350 feet. Each has several wells drilling in the northwest and southwest quarters of 36-9n-6e.

Twin Lakes: Globe Oil & Refining Company and Bauman Drilling Company have been active in this area. Each recently completed dry holes in the Wilcox sand zone at around 4350 feet, although Bauman opened the area with a Wilcox well. Recently completed as a gasser was Portable Drilling Company's Campbell 1, SE SE SW 21-9n-7e, for a flow of 4 million cubic feet of gas from the Upper Calvin sand. Cromwell sand was encountered at 3438 feet and was dry.

Little Pool: Buell, Inc., Mealy-Wolfe, The Carter Oil Company, and Ashland Oil & Refining Company are most active in this old area. Current play is in the Earlsboro sand at around 3300 feet. Several old wells are being plugged back from lower depths and some new wells are being drilled. Initial production in this region averages approximately 60 barrels of oil per day on pump.

Pontotoc County

Activity in Pontotoc County reached a new high, with various oil and gas discoveries. They include:

Ada Area: Senora Oil & Gas Company renewed activity in this old shallow gas pool when it found oil production from the Hunton lime, with Skirvin-Tyson 1, SE NE NE 17-4n-6e. The well was completed for a flow of 288 barrels of oil from the Hunton lime, 2415-60 feet.

Byng Northeast: Although wells from this pool are not spectacular producers, several good completions have been recorded. The pool was discovered in June by J. L. Shaw with Broyles 1, NE NE NW 33-5n-6e, a mile west of the Conservation pool. The well was completed for 30 barrels of oil per day on pump from the Hunton lime, 2576-2767 feet.

Center Pool: This area was opened in July by The Texas Company's Gray 1, NE SE SW 18-4n-5e, and is three miles south of the Bebee pool. The discovery well made 650,000 cubic feet of gas from a shallow sand at 915-81 feet. Total depth, in the Wilcox, was 3248 feet. This formation was dry.

Two recent discoveries opened pools which have not been named. The discoveries are Gado Production Company's Johnnie 1, SW SW NE 32-5n-7e, which made 2,250,000 cubic feet of gas from a Pennsylvanian sand at 1475-82 feet, and C. L. Carlock's Larmon 1, NW SW SE 31-5n-4e, which made 15 million cubic feet of gas from 1997-2011 feet.

Okfuskee County

Okfuskee County's revival has resulted in more gas field than oil field discoveries, although there were several good oil pools opened.

Paden South: J. E. Crosbie, Inc., discovered this pool with Sykara 1, NE NE SW 20-12n-7e, completed for 119 barrels of oil per day on pump from the Cromwell sand. This area is particularly active with several wells already completed as good producers from the formation, which is encountered at around 4500 feet.

Greenlease Pool: A prolific gas pool was opened when Phillips Petroleum Company brought in Overall 2, SW SE NW 15-11n-9e, for 15 million cubic feet of gas from the Cromwell at 3360-70 feet. A number of other gassers have since been completed in this pool.

Hickory Ridge: This pool is typical of the entire area in that it is situated on a small stratigraphic trap. Opened by Amerada Petroleum Corporation, the discovery well, Barry 1, NE NE SW 23-10n-10e, flowed 15 million cubic feet of gas from the Cromwell sand, 3157-63 feet.

Sheldon Pool: This gas area was extended ½ mile west by George C. Vincent's Murgrove 2, CNE SE 17-12n-11e. The well produced 3,460,000 cubic feet of gas per day from a Pennsylvanian sand at a depth of only 810 feet.

Morse West: This gas pool, situated six miles north of Okemah, was opened by Wilcox Oil Company with Lewis 1, SE NE NE 24-12n-9e. The test was completed for 2,400,000 cubic feet of gas from Cromwell sand at 3180-96 feet. Wilcox was topped at 3902 feet and was found dry. Several other wells have been drilled in the vicinity in recent months.

Latest discovery for the county is T. N. Berry's Catlett 1, NE NW SW 29-10n-11e, one mile west of the South Weleetka pool, which was completed for 12½ barrels of oil per day from the Booch sand at 2210-80 feet. The well made 35 barrels of oil per day and flowed 550,000 cubic feet of gas from this formation on an earlier test.

Hughes County

Hughes County has been pushed forward to where it is now one of the state's most productive counties.

Deep Rock Oil Corporation's Hudson 1, NE SW SW 32-7n-10e, extended production of the Horns Corner pool 1 mile southwest, and was completed for 360 barrels of oil and 13 million cubic feet of gas per day at a total depth of 3840 feet in Cromwell sand. The well is situated on a small anticline structure.

A small gas pool was opened when T. J. Lynch brought in Poe 1, CSW SE 32-9n-11e, five miles southeast of Wetumka, for 4 million cubic feet of gas from sand, topped at 1650 feet.

A new pool, 1½ miles north of the Southeast Sasakwa pool, was opened by William Bartlett and associates' Howell 1, SE SW SW 10-6n-9e. The well is pumping 45 barrels of oil per day from Booch sand at 2615-32 feet. The pool is a small anticline, covering approximately 100 acres.

Papoose Southeast: This gas field was opened in January by Tom Leach and O. F. Warren. Brooks 1, NE NE SW 7-9n-10e, four miles northwest of Wetumka, was completed for 5,250,000 cubic feet of gas from Booch sand at 2657-88 feet.

Greasy Creek District: Regarded as a major strike was O. H. Grimes' Meadors 1, SW SE SE 23-9n-10e, four miles southeast of the Yeager pool. The well flowed 30 million cubic feet of gas from the Cromwell sand at 3405-35 feet, and was completed for an initial flow of 50 barrels of oil per hour, 42 gravity, through tubing chokes in the same formation. Skelly Oil Company completed a good gasser 3½ miles southeast of the Yeager pool with Price 1, SW NE NW 26-9n-10e. The well made 10,200,000 cubic feet of gas from Cromwell at 3320-60 feet.

Holdenville Pool: This small pool was opened in March by W. N. Bartlett's Harjo 1, NE NW SE 6-7n-9e. The test pumped 20 barrels of oil per day from Booch sand, 2826-51 feet. The area is 1½ miles north of Holdenville townsite, and there are a number of wells in the pool at present. The pool recently was extended ½ mile east by I. V. Horner et al's Williams 1, SW NW NW 6-7n-9e. This well flowed 150 barrels of oil per day from Booch at 2772-802 feet, accompanied by 5 million cubic feet of gas.

Grief Creek: This new pool (September 20) is four miles east of Holdenville and was opened by B. C. Deardorff. Gentry 1, NW NW NE 14-7n-9e, flowed 200 barrels per day from Booch sand, 2874-94 feet. Initial production on completion was 51 barrels per day.

Pottawatomie County

Always an active county, Pottawatomie also has gained in production during the revival program.

A 20 million cubic foot gasser was completed a mile southeast of the old West Asher pool in April by The Texas Company. Vestal 1, NW NW SE 28-6n-3e, is producing from Layton sand at 2854-78 feet.

East Wanette Area: The area was discovered by Kerlyn Oil Company's Bourassa 1, NW NE SE 21-6n-3e, wildcat one mile east of the Wanette pool, which was finaled for 182 barrels of 39.5-gravity oil on pump from the Layton sand, topped at 2900 feet.

Byars North: A small producing pool, this area was opened by Charles Jenkins with Goodnight 1, SE SW SE 33-6n-3e. The wildcat was completed for 25 barrels daily on pump from Layton sand at 2858 feet.

Dale Pool: Among the more important strikes in recent years was L. B. Jackson and Deep Rock Oil Corporation's Rose 1, eight miles northwest of the Shawnee pool. This pool opener tested for a flow of 185 barrels of oil in seven hours from the Wilcox sand, 5805-12 feet.

Another good strike was J. F. Smith and Continental Oil Company's Klingelsmith 1, SW SW SE 23-8n-2e, 3½ miles west of Macomb, completed in the Wilcox sand at 5640 feet for 103 barrels of oil per day.

Recently a new pay zone was discovered in the Lavoca pool by Willis & Becker with Spaugy 1, SE NW NW 6-6n-4e. The well pumped 50 barrels of oil per day, 36.5 gravity, from the Earlsboro sand, 3777-97 feet. Other wells produce from Wilcox.

The author wishes to acknowledge the aid of G. C. Carlson, consulting geologist, Robert LeFevre, Stanolind Oil & Gas Company; and John Crane, chief geologist, Ashland Oil & Refining Company.

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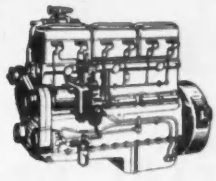

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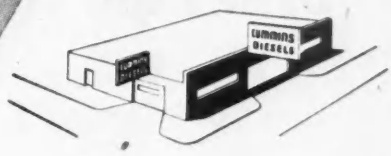

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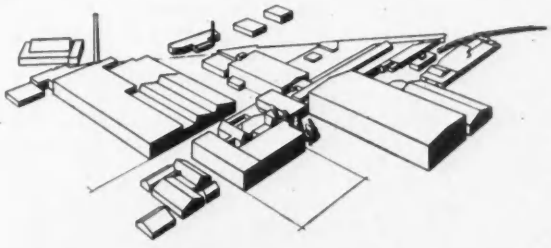

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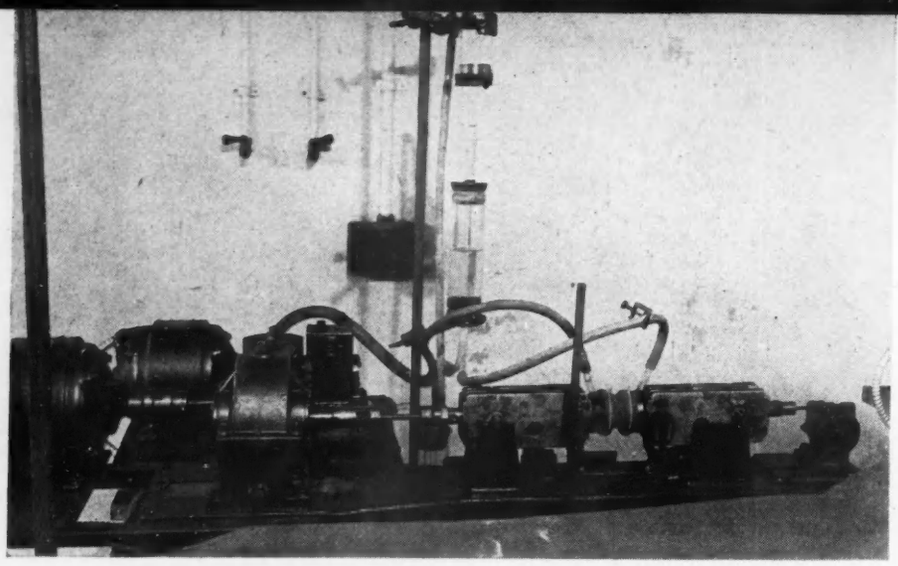


Figure 1. Apparatus for corrosion fatigue

SURFACE PREPARATION And Drill Pipe Fatigue Failure

By W. S. LLOYD, Research Laboratory, National Tube Company, Pittsburgh

DRILL pipe failure may come from a number of causes. One cause which has received increasing recognition is failure by fatigue. However, such failures are rarely caused by fatigue alone, but are accompanied by corrosion resulting in what is commonly known as corrosion-fatigue. While there is an accepted air fatigue limit for materials as well as a mechanically-notched fatigue limit, there can be no fixed corrosion-fatigue limit except for the conditions of corrosion specified and for the specified number of cycles. Corrosion-fatigue, however, can be considered as a type of notch fatigue with the notch chemically rather than mechanically produced.

Under conditions of combined corrosion and fatigue, failure has been found to occur at much lower stress than for plain fatigue or notch fatigue in the absence of corrosion. Various methods, mainly by coatings both metallic and non-metallic, have been tried to combat the effect of corrosion. The usage drill pipe encounters, while not prohibiting such coatings, does make them of less value than for other types of material. Besides the use of coatings the effect of surface finish has also come under consideration, and arguments have been proposed in the field that other surface finish than mill-scaled finish would be beneficial. Since surface finish is more applicable to drill pipe than coatings, this factor was investigated both for air fatigue resistance and corrosion-fatigue.

The investigation was carried out using the regular R. R. Moore type rotating beam fatigue machine. The only modification was for the corrosion-fatigue work where by means of packing glands, rubber sleeve, and hard rubber pump the corrosive medium was continually circulated over the specimen. Equipment for this portion of the test is pictured in Figure 1. The air fatigue specimens were operated at the speed of 1790 revolutions per minute and the corrosion-fatigue at the speed of 189 rpm. The corrosive medium chosen was one which had been adopted as standard, consisting of 30,000 parts per million (22,000 ppm. NaCl, 5,000 ppm. $CaCl_2$, and 3,000 ppm. $MgCl_2$). This analysis (or makeup) roughly corresponds not only to sea water but also to brine encountered in oil well drilling. The average initial pH was 6.1 and the the average pH at the end of the test was 5.9. The solution was at all times at room temperature. Brine may be considered a quite strongly corrosive medium having a primary salinity of 70 percent and a secondary salinity of 29 percent.

The specimens were machined to two diameters, one the standard .300 inch and the other group made .302 inch to allow further treatment. The only other variation was that the straight shoulder was increased in length sufficiently to accommodate the rubber packing ring. All specimens of both diameters were prepared in the usual manner and finished by longitudinal polishing with number 000 metallographic paper.

The composition and physical properties of the material used when normalized at 850° C. are given below.

Chemical Composition

Carbon	.42 percent
Manganese	1.57 percent
Phosphorus	.022 percent
Sulphur	.034 percent
Silicon	.26 percent

Physical Properties

Ultimate Strength	110,450 lbs. per sq. in.
Yield Strength	67,600 lbs. per sq. in.
Elongation in 1.2 in.	26.2 percent
Reduction in Area	62.0 percent

TABLE 1
Endurance Limits of Surface-Prepared Specimens, Normalized and Treated

Treatment	Air Endurance Limit for 10,000,000 Cycles in psi.	Corrosion Endurance Limit for 10,000,000 Cycles in psi. 30,000 ppm. Brine
Polished	49,000	10,000
Scaled	38,000	10,000
Pickled	38,000	9,000
Bullard-Dunn	38,000	9,000
Shot-Blasted	47,000	9,000

Since drill pipe and associated tubular products are, in nearly all cases, supplied with mill finish whether furnished either as hot rolled or normalized material, several types of treatment were investigated, including scaled, pickled, Bullard-Dunn electrolytically cleaned, shot-blasted, and polished. All specimens of the .302-inch diameter (which excludes the polished specimens) were heated to 850° C. for one hour and allowed to cool in still air. This treatment gave a scale depth comparable to run-of-the-mill product.

The scaled specimens were run without further treatment except to clean the tapered bearing ends. Since the scaled diameter was not easily measured, the diameter used was the original diameter less the average decrease obtained when the scale was removd in other treatments.

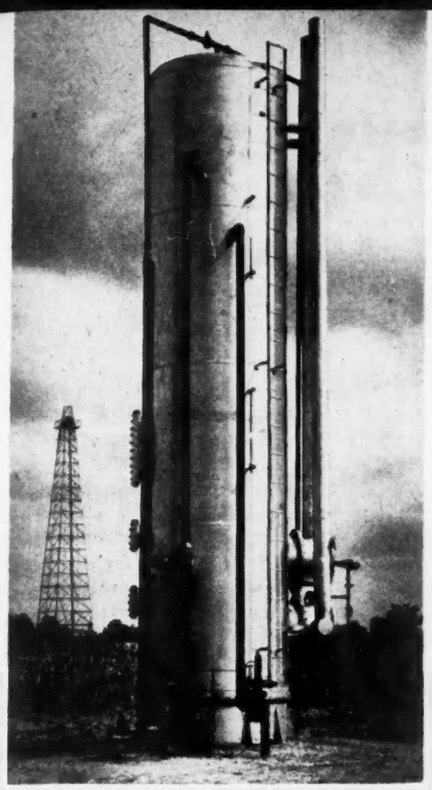
The pickled specimens were pickled in 10 percent H_2SO_4 containing a commercial inhibitor at 140-150° F. When scale removal was complete they were rinsed. Any acid traces were neutralized in hot sodium carbonate solution, and the specimens dried.

The shot-blasted specimens were blasted at 80 pounds pressure using number 80 steel shot.

Results obtained for both air endurance limits and corrosion endurance limits for 10 million cycles in the 30,000 ppm. brine are shown in Table 1.

The air endurance values are in close agreement with other published work and, in line with such findings, polished specimens gave the highest air endurance limit. In some cases, shot-blasting has been claimed to be superior to polished finish, but in this case, while not superior, the shot blast specimens closely approached the values of the polished specimens and were much superior to the other remaining treatments.

The corrosion-fatigue results are quite different from the air fatigue. Here it is clearly shown that regardless of type of surface treatment within the limits of test error there is no difference in the behavior or resistance to combined corrosion and fatigue. Notches are present whether formed mechanically or chemically, and surface treatment has no effect on notch sensitivity. Where a durable film can be retained under stress encountered in service, such as exhibited by so-called corrosion-resistant or stainless material, the problem becomes more one of plain fatigue than corrosion-fatigue. Also, even though the effects of corrosion are not prevented, of several grades of steel the one having the least notch sensitivity will be the most acceptable for service under conditions of fatigue and corrosion. Unless conditioning increases the length of service of drill pipe to an acceptable expected life, either corrosion resisting materials or materials having low notch sensitivity may be necessary in certain cases.



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Secondary Recovery

IN THE NOWATA-CLAGGETT AREA

By ANTHONY GIBBON, Staff Writer

SECONDARY-RECOVERY possibilities in Eastern and Northeastern Oklahoma where conditions are conducive to success because of fairly shallow sands and other favorable factors, are attracting the attention of operators to those areas. During the past year a number of requests to operate water-flood projects in Nowata, Washington and Rogers counties have been received and granted by the Oklahoma Corporation Commission.

It would appear that with the exception of the old pools in Pennsylvania and Southeastern Kansas, the most likely areas where successful water-floods may be expected are to be found in Northeast Oklahoma. Successful application of water flooding as well as other secondary-recovery techniques in depleted or semi-depleted pools in the Mid-Continent as well as in the East have prompted an exhaustive study of the possibilities for Arkansas.

Engineering studies to determine secondary-recovery possibilities in Oklahoma are becoming increasingly important in the trend toward conserving the nation's oil. This operational phase has been recognized by the government in appropriations allocated to the U. S. Geological Survey to be used in preparing economic studies for the benefit of the industry as a whole. Operators already have recognized the value of such studies, have recommended that the work be continued, and in many instances have gone so far as to request such studies for particular pools in which they desire investigative work of this character undertaken.

Results of the survey in the Nowata-Claggett area, conducted by the Mid-Continent region of the Conservation Branch, Oil and Gas Leasing Division of the Geological Survey are significant since they present a picture which, if carefully studied by operators interested in water-flood operations, may save considerable money.

Viewed in the light of current economic conditions, this study may be classified as negative since profits from immediate secondary-recovery operations appear to be marginal. However, reports showing negative results are just as important as those which indicate success, inasmuch as they should save specific investments in secondary recovery exploitation in analogous fields that are economically infeasible for this type of operation.

In the nation's oil fields there are many "stripper pools" requiring this type of investigative work. It is not only of immediate worth to the industry engaged in secondary recovery, but it is also of import to the conservation of the national oil resources. These old "stripper pools" represent a backlog for the oil industry, and it is the opinion of economists that the resources of the "stripper pools" will be utilized before oil-shale or coal become competitive, barring, of course, the possible economic development of synthetic fuel.

Premises

To January 1, 1944, the Bartlesville sand in the Nowata-Claggett pool produced 8,446,000 barrels of oil, or 8.2 percent of the original reservoir oil. More specifically, the yield amounted to 823 barrels of oil per acre, or 3325 barrels of oil per well. Of the total produced, however, 552,522 barrels have been attributed to water-flooding operations. In contrast, the total residual oil in the reservoir is estimated to average 45.1 percent of the pore space, or 9207 barrels per acre. Inasmuch as the application of vacuum and repressuring have shown little response in oil production, future exploitation by secondary-recovery development is believed to be dependent on water-flood operations entirely. A conservative estimate of recovery by water-flooding is 1500 barrels per acre for an area comprising 1477 acres, or 2,215,500 barrels of additional pipe-line oil that may be recovered profitably at the current price of crude ($1.15 per barrel) plus the additional premium of 35 cents per barrel under the subsidy plan. Residual oil saturation of this area approximates 14,238 barrels per acre.

SUMMARY

	Productive Acres	Productive Wells	Gross Oil Production
Primary*.....	555	137	874,876**
Total (To 1-1-44)....	760	184	977,916***
Percent Increase.....	36.9	34.3	11.8

* As defined under "Bartlesville Sandbody" discussion.
** Estimated from normal decline curve to economic limit.
*** Actual production from lease records.

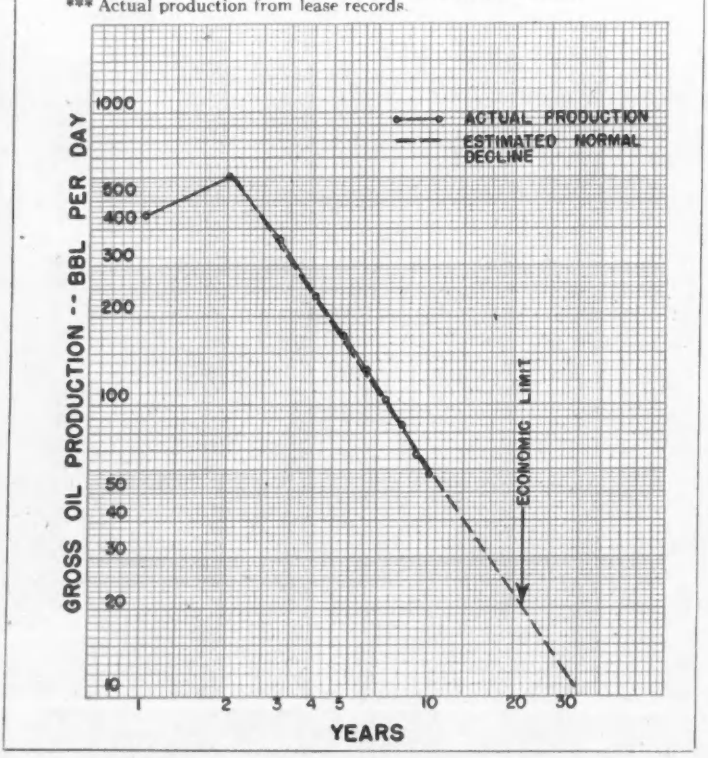


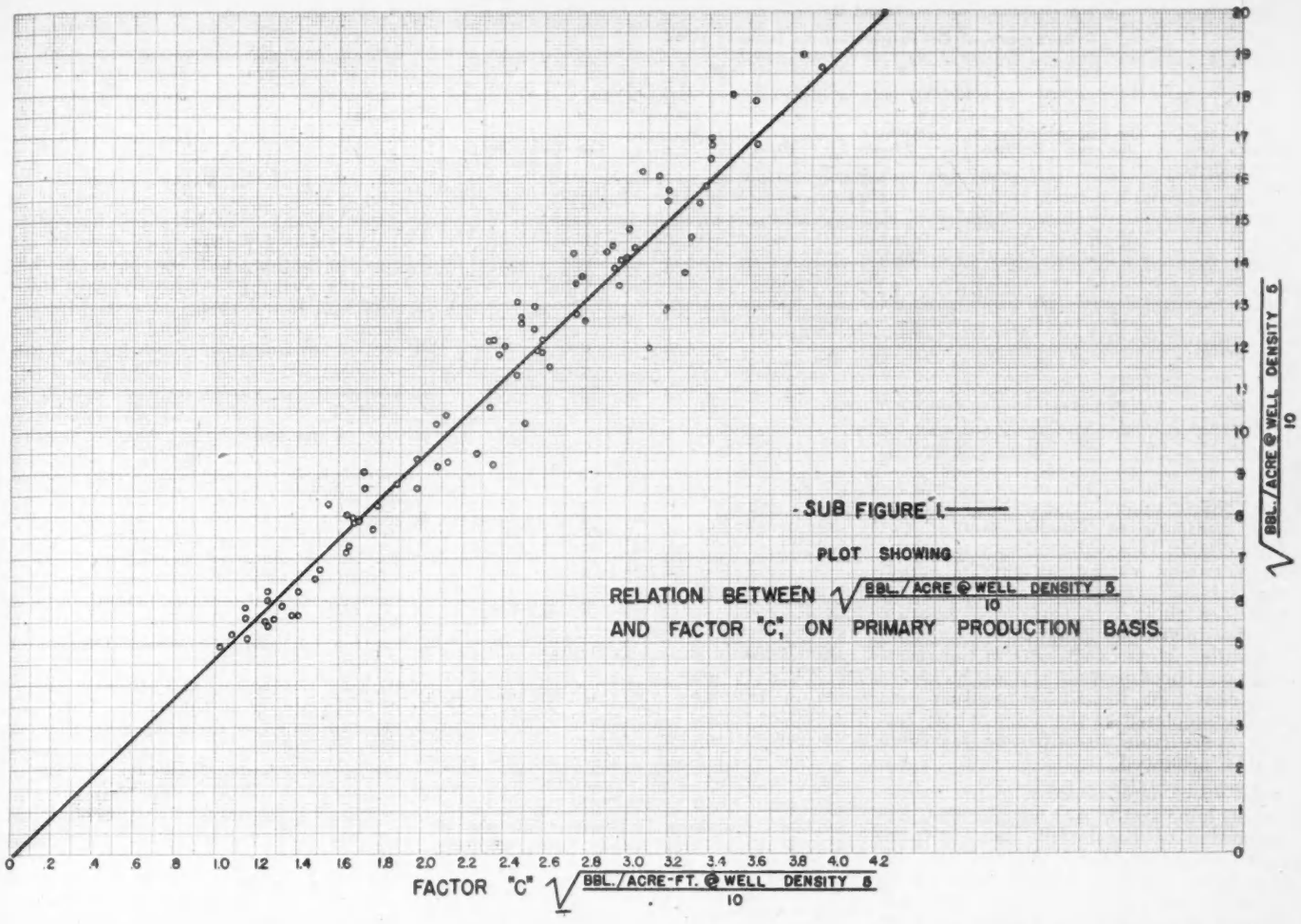
Figure 1. Composite production rate of decline curve of 19 leases, Nowata-Claggett field.

The Bartlesville sand in the Nowata-Claggett area is a lenticular formation about 22 feet thick found at depths ranging from 500 to 750 feet. The reservoir is classified as the gas-expansion type and the accumulation of oil shows no relation to conventional geologic structure. During the early life of the pool average initial productivity rates of wells ranged from ten to 40 barrels daily. Approximately eight years after discovery the productive rates had declined 90 percent. By January 1, 1944, the pool was producing 500 barrels of oil per day from 534 wells, or less than one barrel per well daily.

Production History

The Nowata-Claggett pool was opened in 1906 and reached peak development in 1908-09. In the period 1909-1912 a total of 541 wells were drilled but by 1912 drilling operations had gradually diminished. As a result of rising crude prices in the period 1914-20 drilling was resumed and led to the delineation of the field proper.

Vacuum plants were installed in the pool in 1914 and were operated as late as the early 1920's, although


SUB FIGURE 1
PLOT SHOWING
RELATION BETWEEN √(BBL./ACRE @ WELL DENSITY 5 / 10)
AND FACTOR "C", ON PRIMARY PRODUCTION BASIS.
FACTOR "C" √(BBL./ACRE-FT. @ WELL DENSITY 5 / 10)
√(BBL./ACRE @ WELL DENSITY 5 / 10)
0 .2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

the general response to vacuum on many properties showed little or no effect on production. During the early part of the 1920's air and gas repressuring operations were attempted but as no significant production increase was obtained the practices were abandoned.

In 1937 experimental water-flooding operations were started by intensive pattern-type development of a project in Sects. 8 and 17-26n-16e and the method was adopted readily by other operators. By July 1, 1944, nine projects comprising 653 productive acres were developed within the pool. Notwithstanding the number of water-flood operations undertaken, results from water injection have not been very encouraging with respect to expansion of operations. Of the nine projects developed, four responded moderately to water flooding and five projects reacted negligibly. Nevertheless, to January 1, 1944, water injection had produced 552,522 barrels of oil from the Bartlesville sand from 576 productive acres developed at that time, or 959 barrels per acre. This is 6.5 percent of the total production from the pool from 5.6 percent of the total productive acreage. As previously stated, the Bartlesville sand had produced 8,446,000 barrels up to January 1, 1944, by primary and secondary phases of operation from 2450 oil wells drilled on 10,266 productive acres, or 823 barrels of oil per acre. Of this total production, 7,893,160 barrels, or 769 barrels per acre, are credited to phases of operation (primary, vacuum and early repressuring) other than water flooding. This production represents 93.5 percent of the pools' total production.

Supplementary water flood production and pertinent information to July 1, 1944, pertaining to the nine water-flood projects in the pool is included in the complete report. To July 1, 1944, a total of 591,334 barrels of oil from 653 developed acres, or 906 barrels per acre was produced. The acreage, therefore, includes 6.4 percent of the productive acreage of the pool. Oil recovery previous to water flooding on the acreage included within the nine projects was 1335 barrels per acre. The life of Bartlesville sand wells during primary production was exceedingly varied. Wells producing from the poorer Bartlesville sand body had a productive life of eight to ten years, whereas many wells in the more productive part of the pool produced for 35 years or longer. Most of the longer life wells, however, showed a productive history of about 21 years.

TABLE 1

Reservoir Data of the Bartlesville Sand

Oil production to January 1, 1944, bbls.	8,446,000
Productive acreage	10,266
Oil wells	2,540
Oil recovery, bbls. per acre	823.
Oil recovery, bbls. per acre-ft.	36.6
Oil recovery, bbls. per well	3,325
Well density, acres per well	4.0
Porosity (weighted average), percent	11.5
Thickness of sand (weighted average), feet	22.5
Reservoir void space, bbls.	209,445,700
Interstitial water content, per cent	42.0
Formation volume factor	1.18
Original reservoir as stock tank oil, bbls.	102,948,500
Original reservoir oil as stock tank oil, bbls. per acre	10,027
Original reservoir oil as stock tank oil, bbls. per acre-ft.	446
Oil recovery, percent of original reservoir oil	8.2
Oil recovery, percent of reservoir voids	4.0
Residual oil in reservoir, bbls.	94,502,000
Residual oil saturation, percent of voids	45.1

Reservoir Characteristics

The incompleteness of production records made it impossible for the Survey engineers to construct a decline curve of the total production from the pool. Inasmuch as there were no bottom-hole pressure records the initial reservoir pressure on the basis of the subsurface depth of the producing sand was estimated to be approximately 300 pounds per square inch. Confirmation of the rapid decline of reservoir pressure through unrestricted production is given by the production rate of decline curves for the leaseholds. Decline characteristics as shown are typical of open-flow operations in a gas-expansion type reservoir. Bosworth[1] states that by the end of the second year the production rate in the field had declined 50 percent, the third year 70 percent, the fifth year 83 percent, and the eighth year 90 percent. This decline rate is confirmed by the composite production decline curve shown in Figure 1.

Gas-oil ratio records were unavailable to the engineers but the overall ratio for the Bartlesville sand reservoir was estimated at about 275 cubic feet per barrel. This value was determined by inspection of an analysis of the bottom-hole sample of Bartlesville sand oil which was comparable to the oil produced in the Nowata-Claggett pool and

TABLE 2

Summary of Oil Production to June 1, 1944

Flood	Developed Acreage	Oil Recovery, Barrels			Oil Recovery, Bbls. per Acre		
		Before Water Flood	Water Flood	Total	Before Water Flood	Water Flood	Total
A[1]	304	326,192	254,426	580,618	1,073	837	1,910
B[1]	10	24,550	11,426	35,976	2,455	1,143	3,598
C	18	22,385	12,254	34,639	1,251	681	1,932
D	5	2,200	200	2,400	440	40	480
E[1, 2]	66	101,441	70,853	172,294	1,538	1,075	2,613
F[1, 2]	173	324,900	204,236	529,136	1,879	1,180	3,059
G[2]	28	50,240	25,081	75,321	1,794	896	2,690
H	28	8,750	4,771	13,521	312	170	482
(3)[2]	21	10,879	8,087	18,966	518	385	903
Total	653	871,537	591,334	1,462,871	....	....	....
Average	....	.....	.....	.....	1,335	906	2,241

[1] Active as of July 1, 1944.
[2] Extends beyond pool boundary along Verdigris River; data given applies to area within Nowata-Claggett pool.
[3] No designation given; area in Nowata-Claggett pool is only small part of total project.

was based upon an assumed bottomhole pressure of 275-300 pounds per square inch. It is believed that the operating gas-oil ratios during the initial exploitation period were much greater than 275 cubic feet per barrel because of the inefficient practice of capacity operation. Most of the gas in the reservoir was produced in the early life of the pool and formation pressure was rapidly depleted to the stage where further appreciable quantities of gas could not be produced.

An exact determination of the formation volume factor was not possible. Examination of Bartlesville sand bottomhole sample analyses indicated that this factor for the Bartlesville sand varied between 1.15 and 1.22. Engineers considered it expedient to assume an average formation volume factor of 1.18 for all oil production and oil reserve calculations.

Since the ultimate purpose of the report is the determination of future recoverable oil reserves by secondary-methods, a brief resume is included describing certain secondary-recovery projects that have been developed in the Nowata-Claggett area in order that their performance may be used as a basis for future operations.

Air and Gas Repressuring

Gas repressuring was first initiated in the vicinity of the area in 1920 on property immediately east of the Verdigris River. Available records, especially well-log and production data, indicate that only three air- or gas-repressuring projects of appreciable size have been developed within the pool. In addition, a few air- or gas-input wells were drilled but specific information as to their history or influence on production is not available. Judging from available records, air- or gas-repressuring operations indicate that sand body conditions as to permeability and uniformity are not conducive to profitable operations.

Water-Flooding

Nine water-flood projects were included in the study, five of which have been developed within the boundaries of the pool proper and four of which are continuous on both sides of the Verdigris River. One of the four floods covers only 21 acres and represents such a small proportion of the complete project that a study of the flood in its entirety was not justified. The other eight projects were carefully scrutinized, regardless of whether they were wholly or only partially within the pool.

Table 2 is intended to show the relation between oil recovery prior to water flood development and oil recovery resulting from flood operations, as substantiation of the concept that oil recovery history may be used as a criterion for determining the susceptibility of areas for future water-flood development and operations.

The water-flood projects in the pool have included in their development and operation most of the conventional procedures common to water flooding in the Mid-Continent area. Some projects were developed by a systematic and intensive drilling program, whereas, others were exploited in a more or less haphazard manner. Individually developed projects ranged from five to 304 acres. All were originally developed on the conventional "five-spot" pattern, with 330-foot spacing between like wells, though of necessity the pattern and spacing of those projects using old wells were in some cases slightly irregular. Completion methods and types of surface equipment have varied on the individual projects. With one exception the Verdigris River and shallow gravel-bed wells have supplied water for injection service on all projects, the exception using impounded surface water implemented by water from wells drilled to the Fort Scott lime. All water for injection purposes required chemical treatment but the behavior of certain input wells indicated that the treatment in some instances was unsatisfactory. Plant installations and water treatment varied with the different operators.

A consistent relation exists between sand body conditions as depicted by the sand body condition map (Figure 3) and the performance of water-flood projects in the pool. In the adjoining Coody's Bluff pool some of the most successful water floods in the Mid-Continent area have been operated, one large water-flood project having recovered in excess of 8000 barrels of oil per acre. It is not unlikely that the success of these nearby floods was to some degree responsible for the development of water flooding in the Nowata-Claggett pool, but oil recoveries in the two areas are in no way comparable.

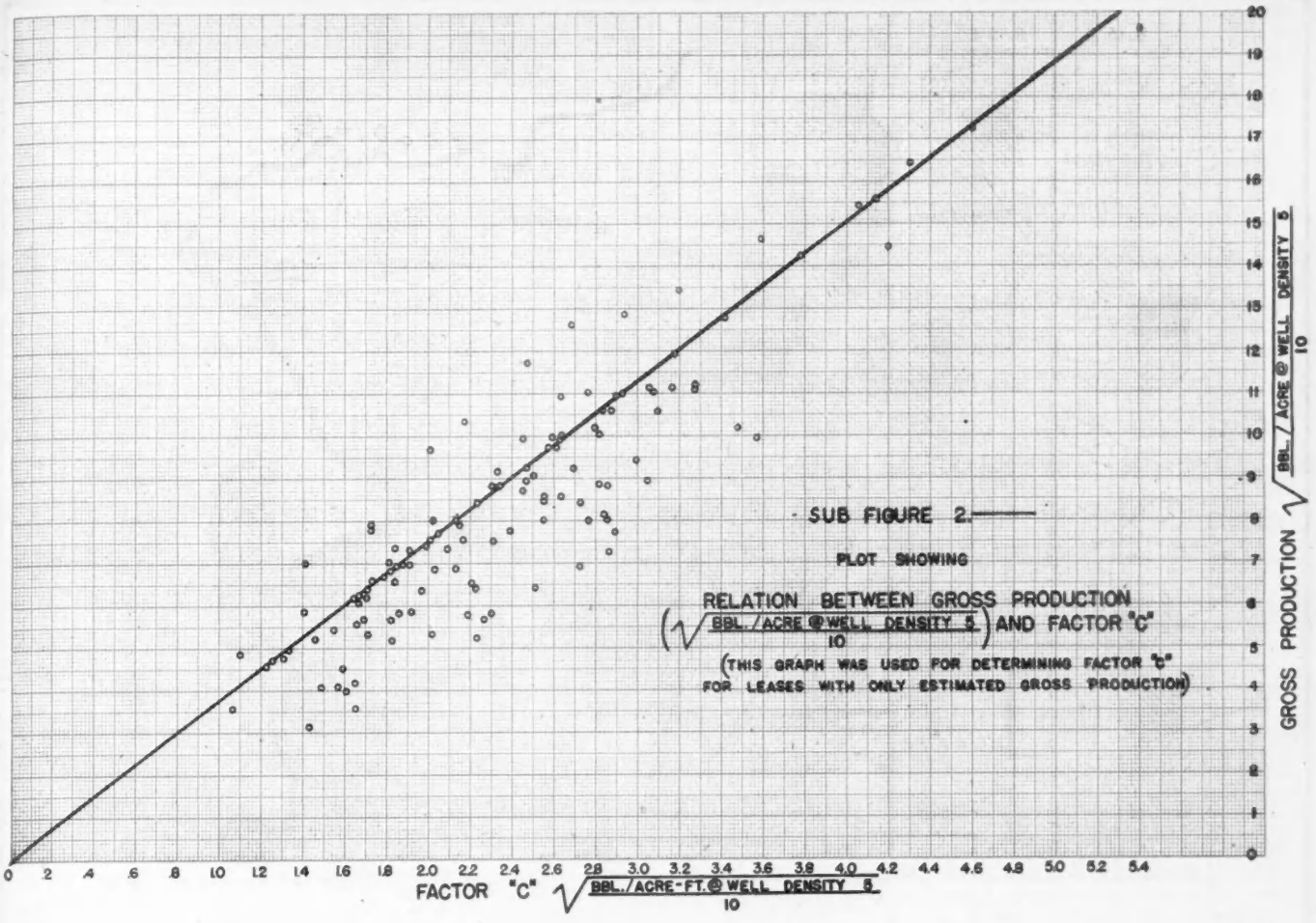
The Bartlesville Sand Body

General characteristics: The Bartlesville sand usually consists of variable amounts of sand and shale. In some areas the productive zone constitutes the greater part of the sand body section and in others it amounts to less than half the sand body. The shaly phases commonly consist of fine grained sandstones interbedded with silty shales and thin beds of shaly siltstones. In several parts of the pool a shale "break" separates the sand into an upper and lower pay zone. These "breaks" often show near-shore characteristics rather than that of marine deposition. On the basis of 1200 logs the average Bartlesville pay thickness was found to be 22 feet. The producing part of the sand body usually consists of fine to medium grained sand of sub-rounded to sub-angular shape. The porosity varies indirectly with the bonding materials. The non-productive part of the sand body either consists of sand with a large amount of cementing material or the tight sand phases consist of thin bedded fine sand and silty shale.

Physical character of sand body: In selecting a likely property for secondary recovery operations the essentials of the required information are, (1) the reserves (barrels/acre), oil and water saturation (percent of void space), and (2) the physical character with respect to permeability and porosity. The policy recommended is to make a core survey before substantial installation investments are made. However, for reconnaissance work it is felt that the lease behavior is a function of the sand body conditions, and the following discussion deals with the investigating engineers, efforts to obtain a method for computing the physical conditions of the sand body by indirect methods because only a few core analysis were available.

Development of Factor "C": The leasehold production up to 1914 is a linear function on logarithmic paper and this production extrapolated to a low economic limit for the leasehold is considered to be the primary production. This production excludes the small influence that was caused by vacuum, the drilling of additional wells and the effects of any secondary recovery operations which may have been installed. The logarithmic relation represents the basis for the development of Factor "C". A composite decline curve for the pool is shown by Figure 1. Also on this figure is shown a summary table which presents pertinent data relative to the effect of secondary drilling and secondary recovery operations on oil recovery in the pool. The increased oil production as a result of secondary operations of all types has been 11.8 percent greater than the estimated normal recovery. This gain for the leasehold represents the development of an additional 37 acres and the drilling of 34 percent more wells. Furthermore, this small increase in production was supplemented by the application of vacuum and by the injection of air, gas and water. The logarithmic graph shows only the production aspect (primary production) used in the sand body study.

The next adjustment was to determine the primary production on the basis of constant well density. The reviving of the old Cutler axiom of "the more wells, the more oil" appears appropriate in stdying the productive ability of these old "stripper" pools which produced from Pennsylvania sands at


SUB FIGURE 2.
PLOT SHOWING
RELATION BETWEEN GROSS PRODUCTION
(√BBL./ACRE @ WELL DENSITY 5 / 10) AND FACTOR "C"
(THIS GRAPH WAS USED FOR DETERMINING FACTOR "C"
FOR LEASES WITH ONLY ESTIMATED GROSS PRODUCTION)
GROSS PRODUCTION √BBL./ACRE @ WELL DENSITY 5 / 10
FACTOR "C" √BBL./ACRE-FT.@ WELL DENSITY 5 / 10
0 2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

reasonably shallow depths and have permeabilities that are considered to average under 50 millidarcies. It was assumed, as has recently been found for many sand bodies, that the production (barrels/acre/feet) is a linear function with the reciprocal of the square root of the well density (acres per well). This concept, down to a reasonably low well density (acres per well) with respect to lenticular sand bodies with low pressure, reasonable low permeability, and gas expansion propulsion, appeared sound and was so considered in the study of the Nowata-Claggett pool.

In a similar study of the Hogshooter pool of Washington County, Oklahoma, which was released by the U.S. Geological Survey and abstracted in THE OIL WEEKLY last year, the depth of the sand ranged from 1100 feet to 1150 feet and the arbitrarily assigned well density was five acres per well. Thus in order to keep the magnitude of Factor "C" essentially the same for like sand body conditions in various pools, a pressure factor is applicable. It is assumed that this pressure correction multiplier is directly proportional to depth and in using 1.6 the primary production is placed on a comparable basis to that of the Hogshooter pool. Factor "C" is now represented by the primary production (barrels/acre/feet times 1.6 @ well density 5) and expressed as:

$$\text{FACTOR "C"} = \sqrt{\frac{\text{Bbl/Acre/Ft @ W.D. 5}}{10}}$$

The calculation of this factor directly for the Nowata-Claggett pool was not found feasible because of the uncertain log information on the oil sand, but it was found for the Hogshooter pool that there was a good relation between

$$\sqrt{\frac{\text{Bbl/Acre @ W.D. 5}}{10}}$$ and Factor "C".

The value of (square root of bbl/acre @ w.d. 5, divided by 10) was determined for all of the Nowata-Claggett leases and then Factor "C" values were determined from the graph. (See Figure 2, sub Figure 1).

On the basis of offset leases it was necessary to estimate the total production and Factor "C" for about ⅓ of the total productive acreage of the pool. Using actual data, a rough relation was found between gross (total) production and Factor "C". This is shown by Figure 2, sub Figure 2. The estimated values for Factor "C" were determined from Figure 2, sub Figure 2.

The sand body condition map (Figure 3) presents the areas of the pool that appear most promising for secondary-recovery operatoins. The map in essence is exploratory. It was constructed from Factor "C" values, but it does not display isolated five and ten-acre areas. Relative to the map, Area 1, excluding 325 acres already flooded, comprises 1477 acres. This area represents the most favorable sand body conditions in the pool with respect to permeability and porosity. Area 2, excluding 215 acres already water flooded, embraces 3217 acres. This area is considered possible for secondary recovery operations with an improvement in the present economic conditions. It is considered prudent, however, to discount the weight given to Area 2, because the production on 25 percent of this area was estimated from off-set leasehold history. Area 3 shows the distribution of the tight and shaly areas of the sand body, and Area 4 represents dry and unknown areas.

The distribution of Areas 1 to 3 inclusive is given in the following table:

Summary of Sandbody Distribution By Areas Developed and Proved Acreage

Area	Acres	Percent of Total Acres
1	1737	16.9
2	3432	33.4
3	5097	49.7
Totals	10,266	100.0

It is common practice in estimating reserves to use a single figure for feet of pay, oil withdrawals and porosity, but when a breakdown by leaseholds is desired this method is not applicable unless detailed information is available for the respective properties. Factor "C" with a magnitude of 4 was arbitrarily assigned the value of 20 percent porosity as only 10 leaseholds had Factor "C" values above four. The porosities for all the leaseholds were estimated at being directly related to Factor "C". The only justification claimed for the use of Factor "C" in this manner is that oil recoveries and residual oil calculations

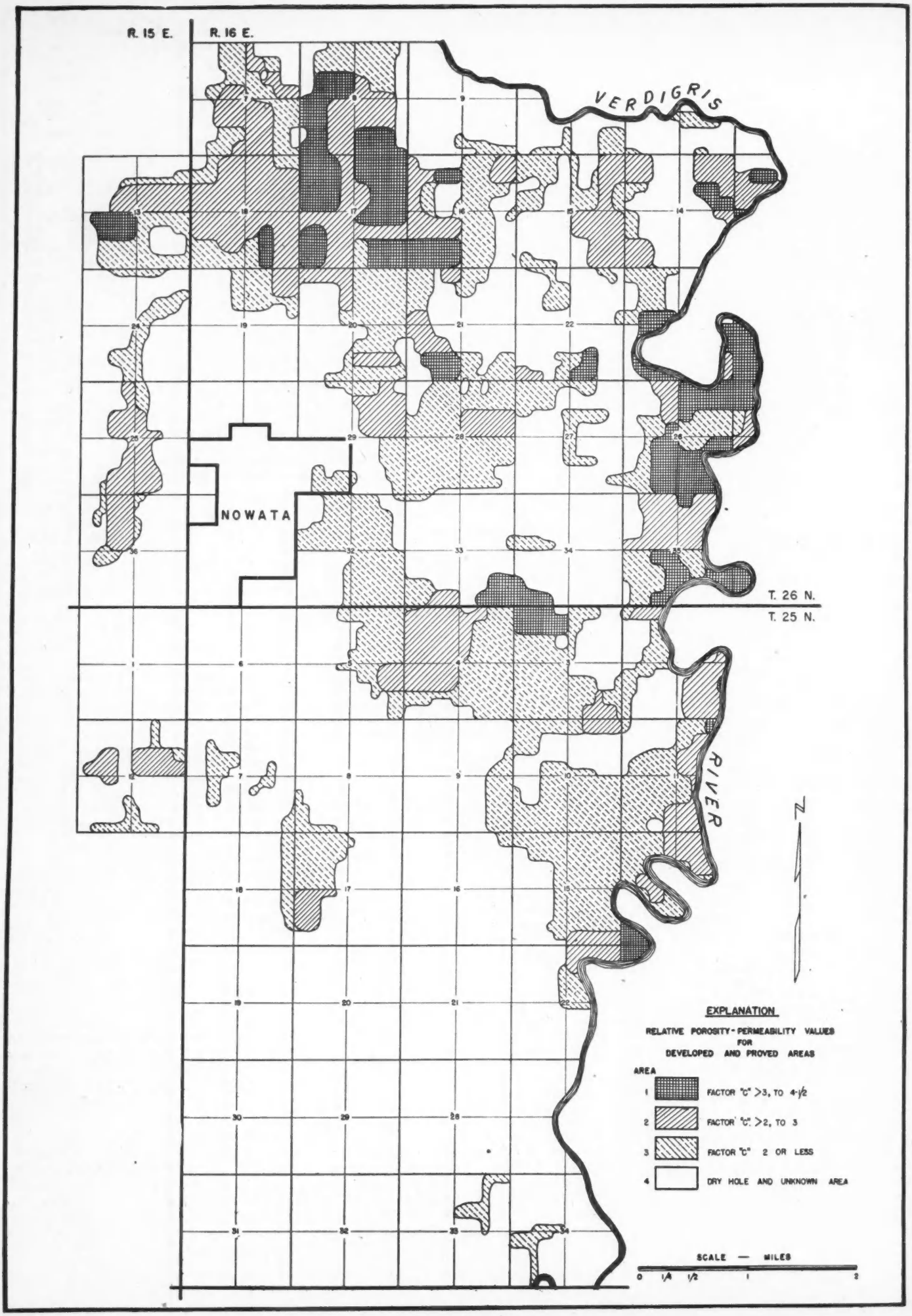


Figure 3. Sand body condition map.

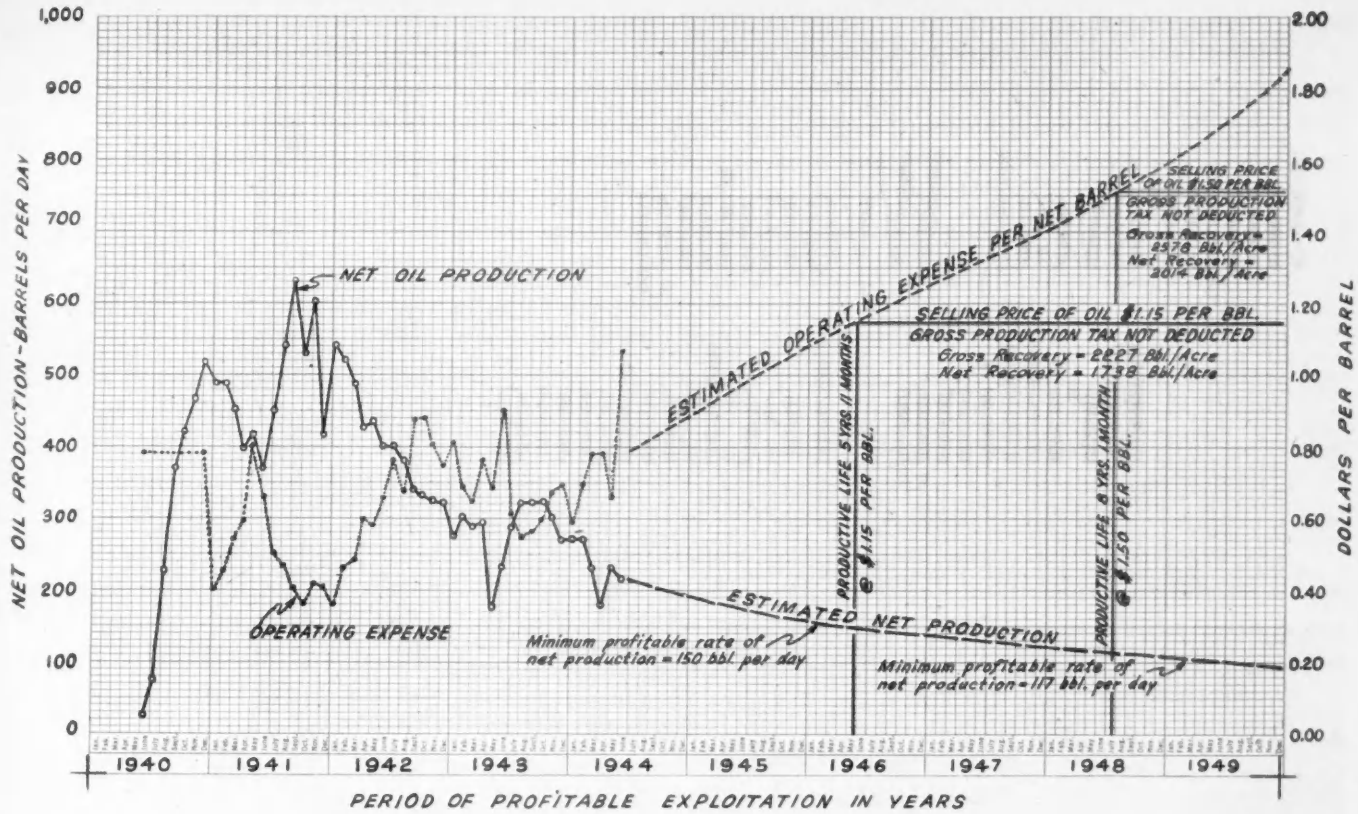

NET OIL PRODUCTION - BARRELS PER DAY
DOLLARS PER BARREL
NET OIL PRODUCTION
ESTIMATED OPERATING EXPENSE PER NET BARREL
SELLING PRICE OF OIL $1.50 PER BBL. GROSS PRODUCTION TAX NOT DEDUCTED Gross Recovery = 2578 Bbl./Acre Net Recovery = 2014 Bbl./Acre
SELLING PRICE OF OIL $1.15 PER BBL. GROSS PRODUCTION TAX NOT DEDUCTED Gross Recovery = 2227 Bbl./Acre Net Recovery = 1738 Bbl./Acre
PRODUCTIVE LIFE 5 YRS. 11 MONTHS @ $1.15 PER BBL.
PRODUCTIVE LIFE 8 YRS. 1 MONTH @ $1.50 PER BBL.
OPERATING EXPENSE
ESTIMATED NET PRODUCTION
Minimum profitable rate of net production = 150 bbl. per day
Minimum profitable rate of net production = 117 bbl. per day
PERIOD OF PROFITABLE EXPLOITATION IN YEARS

Figure 4. Period of economic life of a water flood in the Nowata-Claggett field.

on a pore space basis are reasonable with respect to the production history of the Bartlesville sand in Northeastern Oklahoma.

Secondary Recovery Media

The two alternative methods for future secondary-recovery exploitation of the Nowata-Claggett pool, exclusive of vacuum, are air or gas repressuring, and water flooding. Results obtained through air and gas repressuring operations have been unsatisfactory, although there may be small areas where the producing sand is susceptible to this particular secondary-recovery technique. Moreover, there is no available supply of produced gas in the pool. Eliminating air or gas repressuring from further speculation leaves water flooding as the only practicable secondary-recovery method to stimulate oil production in the pool. Dependable sources of both surface and sub-surface water are available from the Verdigris River and the Arbuckle Dolomite, respectively.

Oil Reserves

The total residual oil content of the 10,266 productive acres is estimated to be 94,502,000 barrels, or 9205 barrels per acre. These reserve data, however, are not expedient as a basis for future secondary recovery development unless sand body conditions are given full consideration. As shown in Figure 3, the productive portion of the pool is divided into three areas of different sand body conditions. Area 1, which represents the best sand body, has an estimated residual content of 14,238 barrels per acre. Area 2 has an estimated residual content of 10,129 barrels per acre, and Area 3, which comprises the tight shaly portions of the sand, has an estimated residual content of only 6767 barrels per acre.

A conservative estimate of oil recovery from Area 1 by future water-flood development can be made on the basis of oil production history. Average oil recovery from this area which comprises 1802 acres was 1870 barrels per acre on January 1, 1944. However, 325 acres of Area 1 were subjected to water flooding prior to this date and the recovery of 1870 barrels per acre for the 1802 acres includes the water-flood oil. The average oil recovery from the 1802 acres, excluding water-flood oil, is estimated to be approximately 1600 barrels per acre. That portion of Area 1 that has not been subjected to water injection comprises 1477 acres. On the basis of an average oil recovery of 1600 barrels per acre prior to water-flooding, it is believed that 1500 barrels per acre is a conservative estimate for expected future water-flood recovery from the 1477-acre area. On the basis of this oil recovery the total recoverable oil reserve of the Nowata-Claggett pool is estimated to be 2,215,500 barerls of pipe line oil.

Economic Factors

Operators in the Nowata district estimate the cost of development and installation of a water flood in the area at from $1000 to $1500 per acre, although such costs may vary with individual operators and also with the different development practices involved. On a few properties in the Nowata district development cost was approximately $2000 per acre; however, on one project the cost was only $750. Operating expense is also variable and is influenced by existing wage scales, maintenance and replacement costs of equipment, costs of water treatment, fuel and power.

Based on the present price of crude oil in Nowata County and in view of development and operating costs of water-flood projects in the Nowata district, a water-flood operation even in the most likely section (Area 1) does not appear attractive. However, the economic feasibility is improved if consideration is given to the possibility of oil recovery exceeding 1500 barrels per acre, and to the aspects of an improved crude oil price structure. On the basis of a crude oil price of $1.50 per barrel, Area 1 appears worthy of consideration for future water-flood development with the possibility of a marginal profit on the investment. Area 2 is ruled out under present market conditions because of unfavorable sand body conditions and expected low oil recovery.

Presented herewith as an interesting study is Figure 4, based on actual data from a water-flood in the Nowata-Claggett pool, and may be considered as a criterion relative to flood operation costs and duration of economic flood life.

REFERENCE

[1] Bosworth, T. O. "Geology of the Mid Continent Oil Fields" p. 24, New York MacMillan Co., 1920.

This article is a digest of "Study of Secondary Recovery Possibilities of the Nowata-Claggett field, Nowata County, Oklahoma," by I. W. Fox, C. H. Thigpen, R. L. Ginter and G. P. Alden, Conservation Branch, United States Geological Survey, conducted under the general supervision of J. R. Reeve, Supervisor Mid-Continent Region, Oil and Gas Leasing Division, U.S.G.S., Tulsa.

Improved Wyoming Drilling Technique

By CHARLES H. RANKIN

AN INNOVATION in drilling practice in the Rocky Mountain region has been introduced by Rocky Mountain Drilling Company in Unit 3, being drilled on the Church Buttes structure in southwestern Wyoming for Mountain Fuel Supply Company and Union Pacific Railroad.

The practice which has proven to be so successful is that of drilling a full 17½-inch hole for the surface casing without first drilling a pilot hole. In this field the casing program calls for setting 2500 feet or more of 13⅜-inch outside diameter surface casing. Conductor, 90 to 100 feet of 22 inch casing, is welded in the derrick and run as a unit.

The Mountain Fuel Supply Company is the operator for its own account and that of Union Pacific Railroad, owner of half the acreage on the structure, which is believed to cover more than 50,000 acres.

Production was discovered in the Unit 1 well, April 9, 1946, in the Dakota sand at 12,687 feet. Preliminary tests show that the discovery well is capable of producing more than 20 million cubic feet of gas and a considerable amount of distillate. Due to the extremely high pressures, considerable difficulty has been encountered in producing the well and it is now shut in pending the design and procurement of heating equipment capable of preventing the chokes from freezing off when the well is placed on production.

On Unit 2, the conventional practice was followed. Eleven-inch hole was drilled to total depth of 3000 feet and then reamed to 17½ inches. In No. 3, it was decided to attempt to drill the 17½-inch hole without first drilling rat hole. It was found that the full gauge hole could be made with fewer bits than were required to ream the same amount of hole on No. 2, and that this could be done in fewer hours' drilling time.

Only 16 days were required on No. 3, as compared with 29 drilling days to drill and ream the same footage of hole on No. 2.

Table 1 shows the comparative figures.

The rotating spuds and mud weight carried on the two holes were approximately the same.

TABLE 1

Comparative Data in Drilling to 2584 Feet

	Unit No. 2	Unit No. 3
Drilling Days:		
11" Rat Hole	12	....
17½" Hole	17	16
Total Days	29	16
Actual Drilling Hours:		
11" Rat Hole	169	....
17½" Hole	246	224½
Total Hours	415	224½
Number of Bits Used:		
11" Rat Hole	19	....
17½" Hole	17	13
Total Bits Used	36	13
Weight Carried	10 Tons	5-18 Tons
Drill Collars	384'-8"	240'-10"

The rigs being used are two of the largest ever assembled in the Rocky Mountain region. The Unit 2 is being drilled with the same rig used to drill No. 1, to a new depth record for Wyoming and was completely described in THE OIL WEEKLY (March 18, 1946.) It is a steam rig with dual draw works, independently driven rotary table and pumps 19½ x 9¼ x 22 and 15½ x 8½ x 20.

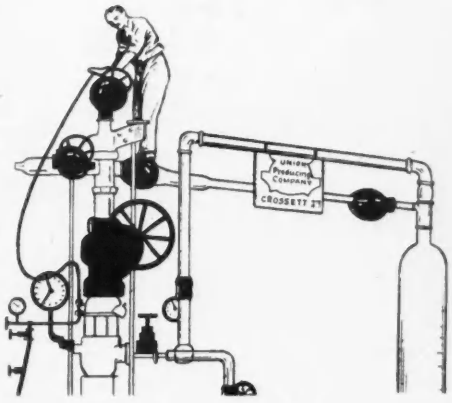
The rig on No. 3 was designed around a power unit on account of the difficulty of obtaining a suitable supply of boiler feed water.

Another unique feature initiated on Unit 3 was the use of five 44-foot, ten-inch drill collars making a total of 240 feet. On Unit 2 the drill collars consisted of 384 feet of eight-inch. The weight carried on Unit 3 was five to 18 tons, while that on Unit 2 was ten tons. One reason the new method was so successful is that the formations drilled are softer than the formations usually drilled in Rocky Mountain wells. The beds at the surface and drilled to 3000 feet are Tertiary, Eocene, in age. They consist mainly of light gray to buff marlstone, oil shale and thin beds of limestone and numerous soft sandstones. The formations usually encountered in Rocky Mountain fields are of Cretaceous and older ages and are harder and well consolidated.

The formations at Church Buttes to a depth of 4000 feet are similar to those found in the oil fields of California.

Safety Depends on Knowledge!

If we know the right way we can avoid doing the wrong way!



FUNDAMENTALS OF INDUSTRIAL Accident Prevention

Part 13-B

Material for Safety Talks

By C. L. HIGHTOWER
Safety Director, United Gas Pipe Line Company
and Union Producing Company

THE accompanying material has been provided for foremen, department heads and others in preparing safety talks for presentation to employe groups.

In their present form the outlines are designed to cover specific accident problems and hazards in a concise and direct manner. However, the material may be supplemented or revised to suit the convenience of the speaker and to meet the needs of the group.

HOW DO YOU LIFT?

MASHED hands and feet and sprained backs are among the more common types of injuries. A very large percent of mashed hands and feet occur in handling material and equipment. Knowing the position to take in lifting and also following correct signals when two or more men are lifting together are important if accidents of this type are to be eliminated.

Following are some tips on lifting:

1. Do not attempt to lift a load that you can not safely handle.
2. In lifting an object stand with your feet slightly spread, bend your knees and raise up, placing the larger part of the load on your thigh and leg muscles rather than on the back muscles. (Give demonstration.)
3. It is always important to get proper footing before starting a lift. Many serious accidents have occurred from a man standing on the edge of a truck or platform and attempting to lift with the result that his foot slipped off, causing him to fall.
4. When two or more men are lifting together, there should be a given signal as to when to raise and lower.
5. If more than two men are lifting, care should be taken not to place the tallest man in the center of the load where most of the burden will be thrown on him.
6. In handling pipe or other objects having a chipped or ragged edge, it is always advisable to wear gloves.
7. If possible, stand with the feet in the clear and hands out from underneath the load so that if it is dropped it will not mash the hands or feet.

HOW TO MAKE INSPECTIONS

Inspections are made and reports prepared on the results of inspections with the thought of detecting and correcting accident-causing conditions. When we stop to consider that a large majority of accidents result from following incorrect practices rather than from physical defects in equipment and tools, we can readily see that the inspector who does not inquire into methods but looks only for physical hazards overlooks the greatest source of accidents.

Usually it is not difficult to locate the physical hazards when making inspections if the inspector is observant and takes sufficient time to look over the equipment or the property. It is sometimes difficult, however, to detect unsafe practices unless we are thoroughly familiar with the work we are checking.

It is, of course, impossible to list all the items we should check in making inspections on a building or plant and it is also impractical to attempt to enumerate the unsafe practices we should attempt to discover when checking on working practices. A few general suggestions may be helpful, however:

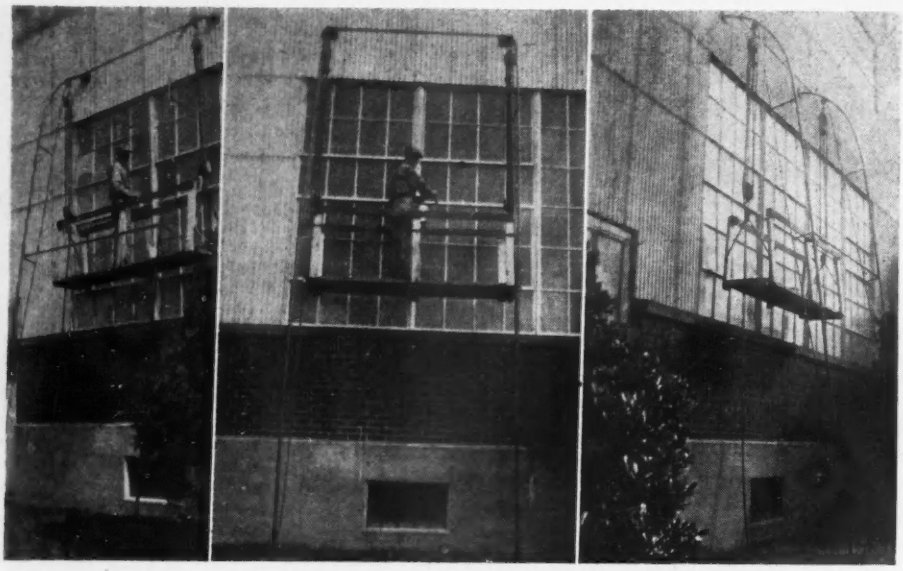
A. Checking physical hazards.

1. Check all hand tools at work benches and in tool chests to see if there are any spread wrenches, loose hammer handles, mushroomed chisels, etc.
2. Check on housekeeping practices to see if there is any loose material or equipment lying around where a person might stumble over it.
3. Check also for fire hazards to see whether or not there is any unnecessary accumulation of rubbish, and whether oily rags and inflammable material are kept on the premises.
4. Check stairs and runways to see that there are no defective boards and no loose objects on steps and landings.
5. Check all overhead platforms to see that hand tools or other objects are not left in a hazardous position.

B. Checking on unsafe practices.

1. Note the position men stand in when handling material and whether or not the load is too great for the number of men handling it.
2. In using hand tools observe whether or not they are being used in the right manner.
3. On chipping, grinding, cutting, or other work where an eye hazard exists, observe whether or not goggles are worn at all times and whether or not such goggles are of the proper type.
4. Observe whether or not practical jokes are being indulged in on the job.
5. Observe the other fellow's driving practices and see whether he takes chances in pulling in and out of traffic, whether he drives too fast for conditions which exist, if he gives proper signals for turns and stopping, and if he recognizes the rights and privileges of other drivers.
6. Observe whether or not the job you are inspecting is properly planned, if the men are working without undue haste, and are not taking unnecessary chances.

It is well to remember in making inspections that the whole idea is to prevent accidents. The man having jurisdiction over the property inspected or whose work is being observed should remember the same thing. Criticism for the sake of criticizing has no place in accident prevention work. It is of necessity a cooperative movement and only by developing such an attitude can we get results.



This scaffold, designed by a compressor station chief engineer for use in maintenance work around the station, combines safety and efficiency with adaptability to the particular needs of the plant.

UNSAFE PRACTICES IN USE OF HAND TOOLS

Hand tool accidents make up about one-fourth the total number of accidents reported. It is of course true that hand tools are used in practically all classes of industrial work, but this explains rather than justifies the unfavorable experience in using hand tools. It would at first appear that a simple tool like the hammer could be used without danger of accidents, but of all hand tool accidents, hammers and wrenches are involved most frequently.

It is also surprising to learn that only a very small percent of hand tool accidents is caused by using a defective tool. In most instances it is a question of using the wrong tool for the job at hand or using the tool in an unsafe manner.

Following are a few of the more frequent types of hand tool accidents:

A. Making up connection when wrench slipped, catching hand between pipe and wrench, mashing finger.

B. Striking valve with hammer when a piece of steel broke off of the valve and struck man in chest.

C. Cutting with chisel and hit thumb with hammer.

D. Digging ditch when the pick glanced off rock, striking big toe of left foot.

E. Tightening nut on valve when wrench slipped and caused man to fall and bruise his back.

As a rule, when we think of accidents resulting from the use of hand tools, we think of skinned knuckles or bruised fingers. It is true that a great many of these accidents produce this type of injury, but in a number of cases, more serious consequences have resulted. In one instance a man slipped while using a wrench and fell from a scaffold, sustaining severe injuries. In another instance a wrench slipped and struck a man in the eye, resulting in loss of sight. These cases serve to point out that in addition to being a source of common and troublesome injuries, hand tool accidents can also be serious.

A few general suggestions with reference to hand tools may be helpful:

A. When starting on a job, make sure you have all the tools you will require.

B. Use the right tool for the right job.

C. Check tools frequently and repair or replace defective tools.

D. Learn the correct manner of using each tool.

E. Take your time; speed can be obtained without rushing.

F. Keep your mind on the job or duty being performed. No man is trained to the point that he can perform his work safely in a mechanical manner.

Tools represent money. Do not indiscriminately leave them lying about. Have a regular place for storing tools and keep them in their place.

ACCIDENTS IN THE MAKING

It has been truthfully said that any article in common use will become hazardous usless the user keeps the thought in mind that "everything is dangerous." Usually we are so closely associated with a thing that we cannot see it. Many conditions and practices which are accident-causing in nature seem to fall into this category.

Following are a few of the things observed while visiting around the system and which apparently escaped the man on the job. How many can you add to this list?

1. A station wagon proceeding down a narrow, rough, oil field road at a fast rate of speed and with a man riding each running board.

2. A station wagon traveling at approximately 50 miles per hour, passing a car on a hill, when another suddenly appears over the crest.

3. Workmen painting inside building with spray gun and not using respirators provided.

4. Employe standing on racked pipe and jumping each joint as it was rolled from the gondola car.

5. Man carrying hot material wearing low quarter shoes with large holes cut in them.

6. Workman grinding cold chisel on grinding wheel. Goggles hanging on hook beside wheel.

7. A warehouse employe uncrating material and walking around and over boards studded with protruding, upturned nails.

8. Employe loading acetylene and oxygen bottles on trucks without help. Truck driver sitting in cab.

Truly, these conditions and practices are accidents in the making. How do we know? Because our files are filled with reports of accidents that occurred from just such cases.

UNSAFE PRACTICES VS. UNSAFE CONDITIONS

In the early stages of organized accident prevention work, primary consideration was given to putting up guards, hand rails, and other such devices to guard against mechanical and physical hazards.

Accidents involving moving machinery and those resulting from physical condition of equipment are usually serious in nature. The installation of guards to protect against these dangers was then, and still is, necessary. However, experience has taught that only a small percent of accidents result from physical conditions of equipment and properties. Most experts estimate that this type of accident constitutes only 5 percent of the total. Our accident records tell us that it is the unsafe practice rather than the unsafe condition which cause most personal injuries.

This being the case, in making inspections for accident-causing conditions or in analyzing accident reports, it is evident that we should look for the unsafe practices rather than attempt to "hang" the hazard or accident on the physical condition of equipment or property.

Unsafe practices are not difficult to recognize and discover. By closely observing almost any class of work, we can usually see whether or not the methods being followed or the unnecessary chances being taken will eventually result in an accident. Someone has said that a personal injury accident is only one occurrence in a unit group of 300. In other words, the man may use a spark-making tool in a gas area 300 times before a fire results and an injury occurs. Or the mechanic may use a mushroomed chisel for 299 times before a piece of the chisel head slivers off and strikes his arm, causing an injury. It's "kinda" like the black bean mixed in with the bag of white beans. If you reach in often enough to pull out a bean, sooner or later you are going to get the black one. The disconcerting feature in reaching in the bag for the bean or in taking chances is that you never know just when you are going to get the black bean or take the wrong chance.

Real safety work means detecting unsafe practices and recognizing unnecessary chances and taking steps to avoid them before the accident occurs. By following the steps outlined below, we can go a long way toward eliminating unsafe practices from our working habits:

1. Study each minor accident or "close shave" and take steps to prevent a recurrence.

2. At every opportunity observe the work procedure followed by your fellow-employe and see if you can pick out practices that he is following which might result in accidents.

3. Study your own job. Know what the probable hazards are and take steps to guard against them.

4. Be alert for the unexpected. Use foresight and think ahead to what might happen under given conditions. Don't wait for an accident to teach you the dangers of the work.

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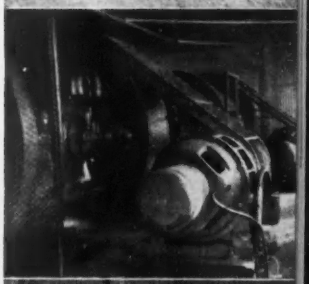

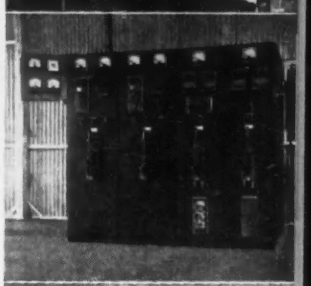

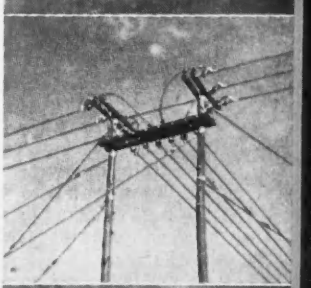

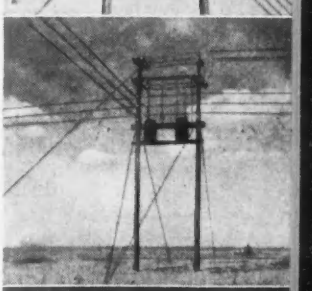

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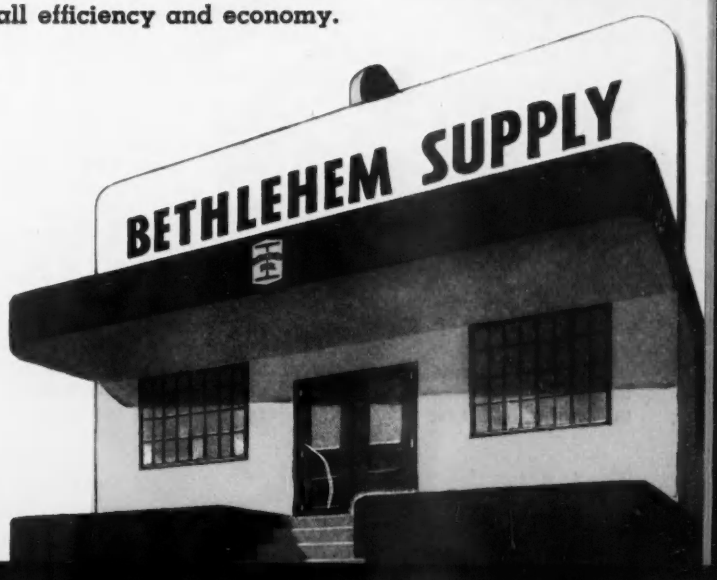

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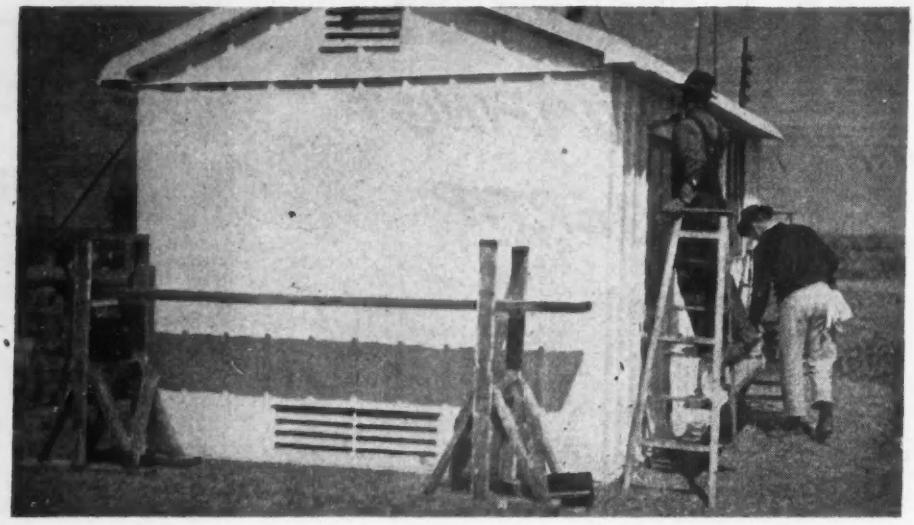

Maintenance crew painting meter station. Note sturdy construction of working platform and supports.

HELPING THE NEW MAN

Someone has said there are two types of workmen who get hurt . . . the inexperienced man who is unfamiliar with the hazards of the job and the safe practices to follow, and the man of long experience who because of his thorough knowledge of the work, becomes overconfident and takes unnecssary chances. Maybe these causes are not always responsible, but we do know that both the new man and the old experienced employe have accidents.

Perhaps the old employe learned wrong at the start, and if this is the case, we can help the new man to help himself by starting him out on the right track.

Too often, the same method is employed to introduce the new man to his job that is used to teach a boy to swim—that is, throw him in and let him go down or swim out .The boy can be pulled out before he drowns but sometimes we can't pull the new man out in time to keep him from getting hurt or hurting somebody else.

Different methods of work are followed as between different companies and even different crews within the same company and department, and for this reason the new man coming into the gang should be told something about the hazards of the job and the safe practices to follow regardless of how much experience he has had in the same or a similar line of work. It is also true that he will "fit in" better and cooperate more fully if he is made to feel that the other men have a friendly interest in his welfare and want to see him get along.

If I were a new man coming into a crew, I would like to know something about the following:

1. If the crew has a good "no accident" record and is interested in safety.
2. What the known hazards of the job are and how to protect against them.
3. The different tools required for specific jobs and how to use them.
4. To whom I should report unsafe conditions and practices that I might observe.
5. What protective equipment is available and when and how I should use it.
6. Where the first aid kit is kept and how to use the material that is in it.

The new man is usually over-anxious to make good and sometimes will undertake things that he does not understand because he either wants to make a good impression or does not want to show his ignorance. The desire to do his share and get ahead is commendable but if uncurbed is likely to get the new man or his fellow workers in trouble.

The new man really needs a helping hand and the experienced employe is in a position to give it to him by starting him out on the right track and teaching him only the safe methods.

HANDLING, TRANSPORTING MATERIAL, EQUIPMENT

The subject of handling and transportation of material and equipment is too broad to attempt to formulate any specific rules. Every job is an individual problem and carries with it individual hazards. All will agree that the most effective method of avoiding accidents on this type of work is to carefully work out a plan of procedure and then follow it. In other words, think out the possible hazards and devise ways to avoid them before the actual work is started.

While we cannot hope to touch upon all of the elements which must be included in our working plan, the following are a few that are met in nearly every material and equipment handling job:

1. Haste. Probably nothing contributes more to accidents than haste, and a well worked out plan should do much to eliminate this hazard.
2. Shoring. When it is necessary to shore up runways, skids, etc., it should be done with wooden blocks arranged so they will not slip or kick out.
3. Supporting timbers. Such timbers should be carefully inspected and if there is the slightest question of their ability to carry the load either from size or condition they should not be used.
4. Sufficient manpower. No man should ever lift more than he can with his leg muscles.
5. Inspection of pipe for burs is usually necessary for its safe handling.
6. Gin poles, ropes, cables, blocks, etc., always require inspection and good judgment in their selection.
7. Trucks used should be big enough to handle the job at hand.
8. Proper footing and adequate working space are very important, for nothing is surer to cause accidents than slippery surface or cluttered place where the work is being carried on.
9. Safe gloves, shoes, goggles, and respirators should be used when their need exists.
10. Rules for safe lifting should be observed.
11. Members of the crew should work in unison when lifting, carrying or lowering heavy objects.
12. Anchoring of all objects during transportation should always be done.

PROPER WORKING POSITION

The proper position of head, hands, body and feet to protect against the unexpected occurrence of an accident is an important consideration on any job. Failure to recognize this fact and to take the precaution to get in the clear may mean the difference between a "no-injury" accident and a serious or fatal injury.

A discussion of the following questions should prove helpful in directing attention to conditions and situations where the exposure hazard exists and the precautions that should be taken under such circumstances to avoid injury.

1. What precautions should be taken and what position should you be in when inflating a truck tire off the wheel? Why?
2. What position should you take in inflating a tire on a wheel?
3. Assuming that a winch line is being used to load equipment and material on truck, what locations and positions would be dangerous to stand in?
4. What is the danger of straddling or stepping over a winch line, pull line or rope under tension?
5. Under what conditions would you consider it safe to stand or work in front of a "dead-end" gate valve under pressure?
6. Why is it considered dangerous to stand between the skids when loading or unloading pipe?
7. How should you take hold of a joint of pipe when handling it by hand?
8. What precautions should be taken before raising or lowering a heavy load by hoist or crane?
9. What position should you take in blowing down a gauge glass on a boiler?
10. Assuming that you have to get beneath a car or truck for some reason, what precautions would you take?
11. Is it good practice to stand with your head or any part of your body in front of a "clogged" valve on a line or vessel? Why?
12. What precautions can be taken to safeguard the feet when handling pipe, fittings, meters or crated material?
13. Is there greater danger of getting the hands caught working with or without gloves while handling pipe, valves and fittings? Why?
14. Is it ever considered safe to stand in front of compressed air hose or to use same for blowing dust and dirt off clothing? Why?
15. From what position should you approach a break on a gas line or a leaking gate valve?
16. Under what circumstances is it safe to reach through the spokes or stand on the flywheel of a gas or gasoline engine?
17. What is the danger area when tongs or wrenches are being used to break out a connection?
18. Is it safe to depend on a jack or should you block up under car, gas engine or other equipment when working underneath?

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COUNTER-BALANCING

A simple, easily-adjusted, shop-made counterweight for use on a rod line jack is contained in the installation assembled by one Montana operator. A length of large size casing was provided with lifting eyes on what would be its upper side, and a shorter length of three-inch pipe was welded to the under side of the weight. At several points along the bottom side of this smaller pipe machine bolts were attached, these being long enough to extend through and beneath the paired channel iron beams making up the tailpiece of the jack. After being filled with concrete, the weight was clamped in place atop the beam, small steel plates being placed across the channels at the bolt positions and the nuts drawn down securely.

Such a weight is inexpensive to construct, is easily shifted along the beam for adjustment to varying well loads, and is sufficiently flexible in its installation to make it suitable for salvage and re-use on other wells if necessary.

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

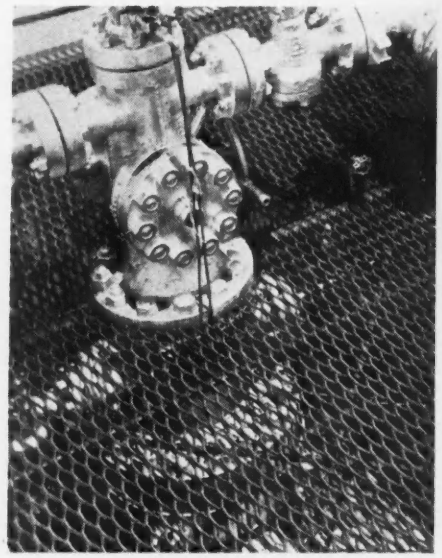
Interior Lighting Improved By Proper Painting

LIGHTING

In certain fields in the Rocky Mountain and Canadian areas, where pumping equipment must be shielded against severe temperature drops, it becomes necessary to weatherproof the engine house by closing in the areas above eave height and insulating the interior with additional siding material. In so doing, the interior of the house, generally lighted with only one and perhaps two small windows, becomes quite dark, with resulting danger to pumpers or other field personnel who have to work on the pumping equipment. One Montana operator greatly improves the interior lighting in such structures by painting the interior wall and ceiling surfaces with aluminum, white or other bright paints.

The accompanying photograph, taken without aid of artificial lighting, attests to the effectiveness of this policy. Since paint of some color generally must be chosen for protection of interior surfaces, it is little or no trouble to use a type or color that will provide maximum reflection of light. Even on rough interior woodwork, use of a light paint will greatly improve the lighting qualities of the enclosure, both for daylight and artificial sources.

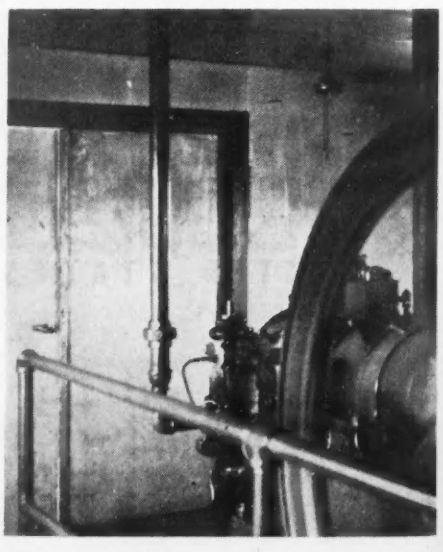
Metal-Decked Cellar



CELLARS

The sectionalized, well-supported flooring used by one company to cover the cellars of their flowing wells is both inexpensive to build and at the same time easily removed for access to cellar fittings. Built into small sections which are custom fitted around the well head, the flooring is of expanded metal, and is reinforced underneath by transverse lengths of sucker rod material, these braces being attached to the flooring in much the same fashion as the longitudinal braces beneath the flooring of a bridge structure. Each of the sections is edged with a length of two-inch pipe, giving additional rigidity to the flooring. Two men can easily remove the flooring and it can be laid aside in a neat pile while the well is being reworked.

The expanded metal surfacing allows visual inspection of the cellar and well fittings at all times, and also prevents accumulations of gas from minor leaks that might develop.



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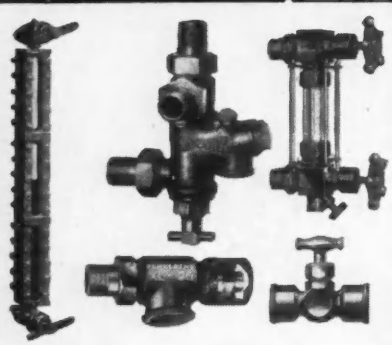

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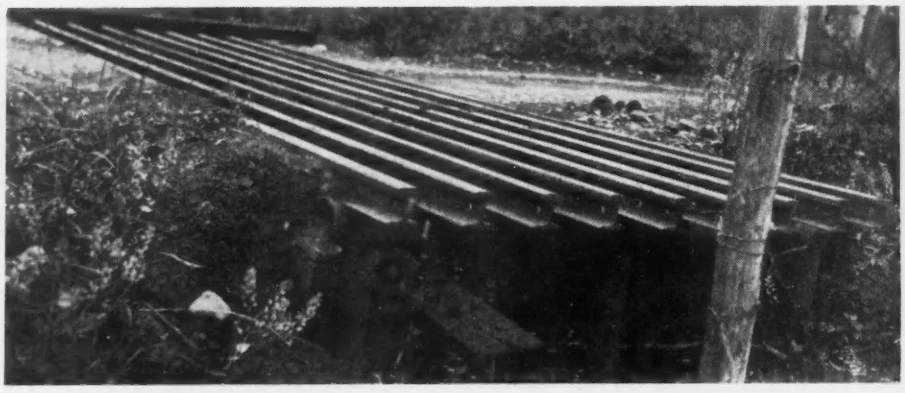
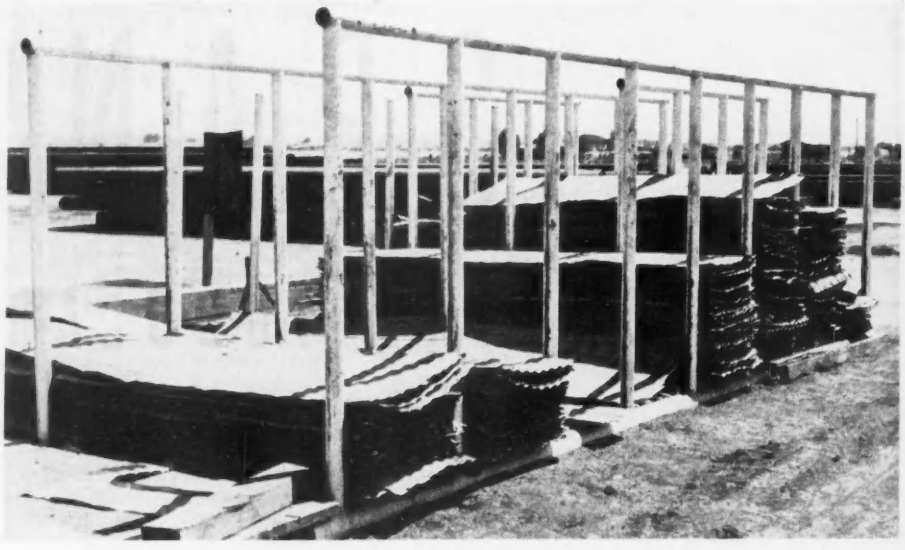


ROADS

In order to be assured of their cattle guards supporting any weight that might be rolled over them during the expected life of the lease, one company makes it a practice of fabricating a box-type guard of considerable strength. Built in the shape of a rectangular box and made up largely of salvaged casing of from four to six inches in diameter, the guard is surfaced with rails and is of all-welded construction. The structure is intended to be hauled as a single unit, and can be easily positioned in the average fence or creek crossing. Such a guard, while more expensive at the outset, may indeed be the most economical when it is realized that in moving heavy equipment in or out of the lease, it might be necessary, with conventional light guards, for trucking equipment to make costly detours or halt operations until suitable reinforcing could be installed at the crossing. Such is commonly the case when contractors, who generally use the heaviest equipment possible to save frequent trips, find themselves temporarily halted in their work due to a light structure designed for the lighter weight trucks and tractors of ten years ago.

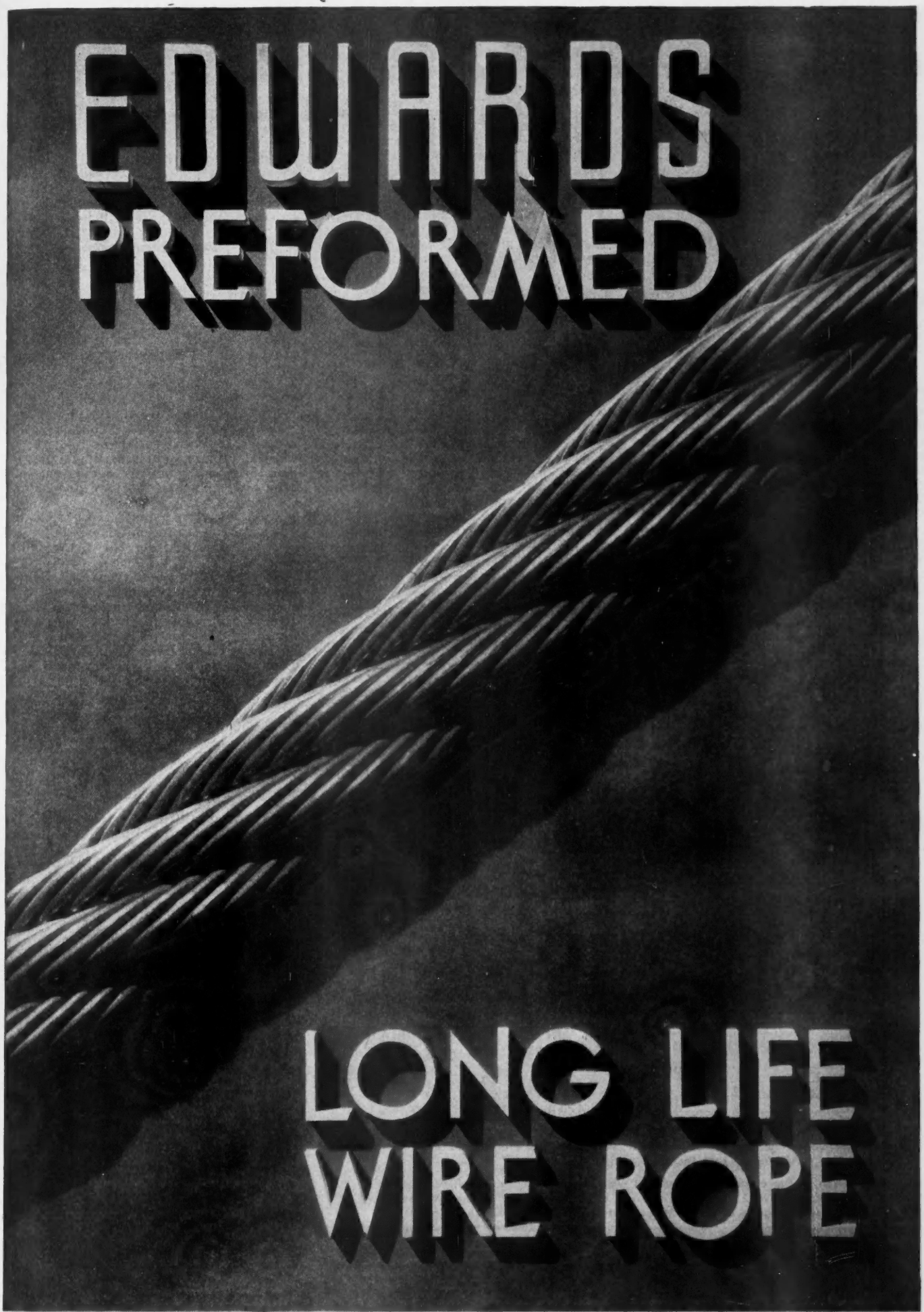
Racks Keep Corrugated Iron in Orderly Stacks



MATERIAL HANDLING

Corrugated iron—new or used—is fast becoming less available, so many companies are hastily retrieving all such material that they can from little-used installations in the field, and stacking it in their storage yards. A neat, efficient rack built up out of salvaged pipe materials is used by one company in their storage yard. It is divided into compartments so that sheets of different lengths and various grades of quality of each length can easily be segregated at the time the material is unloaded from the field truck.

Stringers of salvaged six-inch casing were laid down along the ground and three-inch uprights approximately eight feet tall were welded at the proper intervals along the top side of the base members. The uprights were then tied together at the top by three-inch stringers. Steel slats, made of sucker rod or any bar material, were welded across the length of each section to lend ample level support to each individual pile of sheeting.



E. H. EDWARDS COMPANY — SEATTLE — PORTLAND — SAN FRANCISCO — LOS ANGELES — HOUSTON

Oil Industry Papers Presented At Petroleum Electric Power Meeting

Several papers pertaining to the oil industry were presented before approximately 100 members of the Petroleum Electric Power Association at the 18th annual conference of the organization in Tulsa December 3-4.

Paul Griffith of the Arkansas Power & Light Company, Little Rock, was named president for 1947-48, replacing H. C. LeVois, Gulf States Utilities Company, Port Arthur, Texas.

D. C. McKee, vice president of Empire District Electric Company, Joplin, Mo., made the keynote address at a banquet and reviewed the activities of the organization since its founding in 1928.

A resume of some of the papers presented at the convention follows:

Max H. Halderson, Phillips Petroleum Company, Bartlesville, Okla., delivered a paper on "What Utilities Should Do to Secure Production Business." He stated that utilities must provide electric energy at a cost that will compete with the cost of operating gas engines on cheap fuel (fuel gas costing less than 20 cents per thousand cubic feet) and showed that if lower cost is not forthcoming for purchased power, the proportion of wells pumped with electric power will not increase, and may decrease.

Future Power Use

A. N. Horne, vice president and assistant manager of the Texas-Empire Pipe Line Company, Bartlesville, Okla., in his paper on "Future Use of Electric Power for Pipe Line Pumping," said that in order to have more economy in operation of pipe line systems, operators should look to: (1) larger diameter lines; (2) fewer pump stations, and (3) simplified pumping equipment. To attain the fullest economy in application of these three factors, the cost of fuel or power for the prime movers must be comparable. Future use of electric power rests almost exclusively with the power companies, which means the final answer is the ultimate cost to the pipe line companies. With future possible atomic power converted into electric energy, this should solve many of the power generating cost problems of the power companies, thus resulting in substantial reductions in rates.

"Refiners Viewpoint of Electric Power Usage" was the topic of a paper delivered by W. H. Stueve of the Oklahoma Gas & Electric Company, Oklahoma City. He showed members that the use of purchased power was the cheapest possible means of refining, and that the average cost in 1939 of refined products was only .4 of one percent of the total product, while the average cost of other power was 8.5 cents.

Various ways in which electrical layouts can be installed to provide maximum economy in the fields was laid before members by J. N. Poore, petroleum specialist, General Electric Company, Dallas. In his paper on "Electrification on Producing Oil Fields," he gave estimated costs of different layouts suggested by his company.

In a paper on "Newer Electric Power Equipment for the Oil Industry," B. M Brown, manager of the petroleum and chemical section of Westinghouse Electric Corporation, East Pittsburgh, Penn., showed that due to increased improvement of pumping equipment as well as electrical equipment, lower operation costs and maintenance will be attained.

Pump Installation

A discussion on the theory of pump and compressor installation was given by Fred Wetzel, district manager of the Ingersoll-Rand Company, Tulsa. He illustrated his paper, entitled "Use of Electric Power for Pumps and Compressors in Oil Refineries," with a number of charts.

"Use of Variable Capacity Pluger Pumps with Electric Motors for Pipe Lines" was given by B. F. Thompson, Public Service Company, Tulsa. He discussed a practical variable stroke reciprocating pump manufactured by a prominent firm, and how the equipment has been aiding men in the pipe line industry.

T. A. Workman and Ray K. Glenn, advertising representatives, delivered papers on advertising for the coming year.

Lon Watson, Southwestern Public Service Company, Amarillo, Texas, was elected vice president, replacing Duane Landon, St. Joseph Light & Power Company, St. Joseph, Mo., and C. L. McNeese, Houston Lighting & Power Company, Houston, was named secretary-treasurer, replacing Griffith.

Directors named include: T. E. Graham, Oklahoma Gas & Electric Company, Oklahoma City; Watson, Landon, LeVois and McNeese; P. M. Cordell, Texas Electric Service Company, Fort Worth; J. E. Moody, Southwestern Gas & Electric Company, Shereveport; O. W. Jones, Central Power & Light Company, Corpus Christi, Texas; and R. E. Frey, Kansas Gas & Electric Company, Wichita, Kansas.

The 1947 convention will be held in Corpus Christi.

Pioneers to Meet

Feature of the after-dinner program at the Petroleum Production Pioneers' year-end party on December 13 in Los Angeles will be a discussion of early oil developments in California, led by Frank F. Hill, retired Union Oil Company production executive. Hill has selected a group of oldtimers to participate in the discussion and answer questions about the "good old days."

The entertainment program is in charge of Lou Bronzan. G. E. Gosline, president of the organization, has announced that membership has now reached a total of 500.

Proration Hearing Set

Louisiana's statewide oil and gas proration hearing will be held by the Department of Conservation in New Orleans December 13, J. L. McHugh, commissioner, has announced. Evidence relative to market demand will be taken from producers and purchasers preparatory to setting oil and gas well and field allowables for the 59-day period of January and February, 1947.

Illustrated above is the Models AEH to AHH series of 4-cycle single cylinder Wisconsin Air-Cooled Standard Engines, to which the following specifications apply:

MODEL	AEH	AFH	AGH	AHH
Bore	3"	3¼"	3½"	3⅝"
Stroke	3¼"	4"	4"	4"
Cu. in. Displ.	23	38.2	38.5	41.3
Hp. Range	4-6	5-7	6-8.5	7-9
Weight	130 lbs.	170 lbs.	175 lbs.	180 lbs.

If your equipment calls for an engine within the above power range, it will pay you to give serious consideration to the Wisconsin line . . . noted for rugged, heavy-duty serviceability and thorough-going dependability.

In addition to the engines listed above Wisconsin 4-cycle single cylinder engines are also available in 2 to 4 hp. sizes, and V-type 4-cylinder engines can be supplied in a power range of 13 to 30 hp. Detailed data furnished on request.

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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Oil field distributors for Wisconsin Engines and all types of utility units.

UNIBOLT "X" BEANS

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30 Sizes up to 1/8 inch

available in economical inserts

4 to 1 GREATER ORIFICE SELECTION

Beans Drilled In Increments of 1/64th Inch		Beans Drilled in Increments of 10% OF WELL FLOW			
1/64•	2/64•	X1•	X2•	X3•	X4•
3/64•	4/64•	X5•	X6•	X7•	X8•
5/64•	6/64•	X9•	X10•	X11•	X12•
7/64•	8/64•	X13•	X14•	X15•	X16•
		X17•	X18•	X19•	X20•
		X21•	X22•	X23•	X24•
		X25•	X26•	X27•	X28•
		X29•	X30•	X31•	
Only 8 Orifice Sizes Available Up To 1/8th Inch		31 Orifice Sizes Available Up To 1/8th of an Inch			

One master bean, plus a hand full of "X" Bean inserts, gives you thirty-one sizes of positive chokes *up to* 1/8*-inch!* The economy of replacing one of these small, inexpensive inserts as compared with replacing a standard 6" long bean is apparent, but of even greater significance is the fact that UNIBOLT "X" BEANS enable the operator to produce any predetermined amount of oil or gas with a high degree of precision never before attained. Whereas fractionally drilled beans, with their widely varying flow increments, are limited to eight sizes up to 1/8 inch, "X" Beans are drilled in increments of 10% of well flow and, consequently, offer nearly 4 times as many orifice selections in the same range. (Sixty sizes up to 1/2 inch). "X"-31 and larger beans are standard full 6" length.

Complete details including several pages of charts which correlate the volume of dry gas flow thru UNIBOLT "X" Beans and beans drilled in increments of 1/64", are carried in the new UNIBOLT Catalog No. D-46. Write for a copy.

THORNHILL-CRAVER COMPANY

HOUSTON, UNIBOLT THE ONE BOLT COUPLING TEXAS

Fuel Oils Production Decreases, Output of Motor Fuels Stepped Up

Production of fuel oils was decreased, while motor fuel output was stepped up during the week ended November 30, according to The American Petroleum Institute.

Stocks of the burning oils continued to be reduced by the rapidly increasing seasonal call for fuel, while gasoline stocks appear to have definitely begun their winter accumulations.

Crude production in U. S. fields averaged 4,795,000 barrels daily during the week of November 30, a drop of 15,000 daily from the previous week's rate, but 347,000 barrels or 7.8 percent over that of last year's like period.

Crude runs to stills amounted to 4,707,000 barrels during the week, to show an increase of 86,000 a day over the runs of the previous period, and 98,000 barrels or 2.1 percent more than those of the comparable week of last year.

Above-ground stocks of refinable crude totaled 225,119,000 barrels on November 23, an increase of 3,449,000 barrels during the preceding seven days, according to the Bureau of Mines. These stocks were 5,756,000 barrels or 2.6 percent greater than the 219,363,000 barrels held November 24, 1945.

Production of gasoline, including natural blended at the refineries, totaled 15,145,000 barrels in the week of November 30, an increase of 131,000 over that produced in the previous week, and 359,000 barrels or 2.4 percent more than output of last year's comparable period. Stocks of finished and unfinished gasoline increased 925,000 barrels during the week to the new level of 88,371,000 barrels. This new level is 1,831,000 barrels or 2.1 percent higher than that of a year ago.

The week's output of distillate fuel oil, totaling 5,258,000 barrels, was a drop of 351,000 from last week, but was a 595,000 barrel or 12.8 percent increase over the corresponding period of last year. Stocks of this home heating oil were lowered 481,000 barrels during the week and ended the period at 66,062,000 barrels. This inventory exceeds the 44,562,000 on hand a year ago by 21,500 barrels or 48.2 percent.

Residual fuel production was cut back 166,000 barrels to 7,672,000 for the week, which is 1,260,000 barrels or 14.1 percent less than was produced in the like period of 1945. Withdrawal of 1,418,000 barrels from residual stocks brought them down to 58,647,000, which left them 12,715,000 barrels or 27.7 percent higher than the 45,932,000 in storage a year before.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	4,762	9-30	4,798	12-30	240,992	1- 1	89,162	4- 1	48,162	10-28	64,744	10- 7
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,911	8-31	229,430	3- 2	105,233	2-16	[1]67,286	11- 9	61,636	11- 2
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 3
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-13
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-18	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	220,258	9- 9	76,302	1- 1	30,232	4-19	49,737	3-18
1945	3,621	10- 6	3,409	10-6	[4]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	85,324	9-28	25,131	3- 9	37,289	4- 6

TRENDS OF 1946

Trends in Week Ended	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,312	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 2	4,759	4,769	221,870	14,594	85,930	5,371	65,943	7,434	61,636
November 9	4,779	4,714	221,302	15,001	86,963	5,401	[1]67,286	7,503	61,340
November 16	4,792	4,716	221,670	14,682	88,007	5,555	67,221	7,644	60,552
November 23	4,810	4,621	225,119	15,014	87,446	5,609	66,543	7,838	60,065
Nov. 30, 1946	4,795	4,707	.....	15,145	88,371	5,258	66,062	7,672	58,647
Dec. 1, 1945	4,448	4,609	[5]219,363	14,786	86,540	4,663	44,562	8,932	45,932
Change:									
In Week	—15	+86	+3,449	+131	+925	—351	—481	—166	—1,418
In Year	+347	+98	+5,756	+359	+1,831	+595	+21,500	—1,260	+12,715
In Year	+7.8%	+2.1%	+2.6%	+2.4%	+2.1%	+12.8%	+48.2%	—14.1%	+27.7%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, November 24, 1945.

Pennsylvania Grade on List Of Crude With New Prices

The past week added Pennsylvania grade to the long list of crudes whose prices have been advanced within three weeks, leaving only the West Coast fields unaffected by the rise.

Prices of refined products are generally being raised as a result of the recent crude price hike, with the more recent Pennsylvania advance already being reflected by scattered raises in that area's products prices and expectation of more to follow.

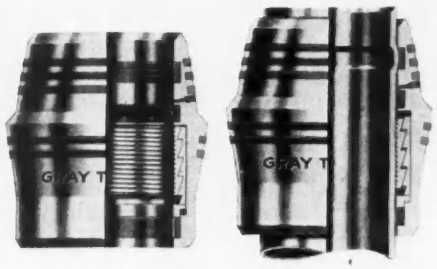
The Joseph Seep Purchasing Agency of the South Penn Oil Company announced a 14-cent a barrel increase in prices it will pay for Pennsylvania grade crude. The Pennzoil Company announced a comparable increase in the price it will pay for the same crude in the National Transit Company's pipe line. While no announcements of price advances have been made by several other large crude purchasers in this area, they have indicated intentions to act soon.

Since the recent price raises for other crudes, there have been many predictions on hikes in Pennsylvania grade postings, even though the raise will not benefit producers due to the present stripper-well subsidy program.

Standard Oil Company of New Jersey advanced its prices on gasoline, kerosine, distillates and heating oil .3 cent per gallon, effective November 30, while the Atlantic Refining Company upped its tank wagon prices for gasoline, kerosine and No. 2 fuel oil throughout Pennsylvania and Delaware. The increases were ½ cent on gasoline and kerosine, and .2 cent on No. 2 fuel. Socony-Vacuum Oil Company boosted its gasoline prices .2 cent a gallon in New York and New England, and .3 cent in some parts of North New Jersey.

Lube oil prices remain firm, with supplies tight and packaging materials more scarce than ever. One Mid-Continent refiner reported .25 to 2 cent increases in lube postings for bright stocks and neutral oils, and although no increases have been announced in Pennsylvania, several refiners indicated that the crude increase would necessitate a 2-cent rise in lube quotations.

THIS PART CONTRIBUTES TO THE OVERALL ADVANTAGES OF GRAY COMPLETELY COORDINATED SYSTEMS OF WELL CONTROL



Gray Control Type Casing Hanger

The GRAY ROLLED SEAL CASING HANGER

The Gray Rolled Seal Control Type Casing Hanger eliminates the need for choosing between disadvantages inherent in welding and the use of short-lived materials. This new Gray Casing Hanger is simple in design and free from superfluous parts, provides for well control interchangeable with Gray methods of the past, the pressure subject area exerted against the seal is practically nil, and the materials used are long-lived in nature. The rolling operation in forming a seal between casing and hanger is quickly and conveniently performed, using available rig equipment, including Kelly joint as weight and the rotary as the rotating medium. It has been successfully tested numerous times.

The Gray Rolled Seal Control Type Casing Hanger performs its purpose without sacrificing any of the fundamentals of good well control practice:

1. **Complete well control, including the maintenance of temporary seals until permanent seal has been formed;**
2. **The reduction of pressure subject areas in the control equipment consistent with the setting of smaller sized casing;**
3. **Simplicity, through the use of the smallest number of the longest-lived, highest quality parts;**
4. **Economy, which results without loss of quality when fewer parts are needed;**
5. **The ability to have control during the disassembling of equipment after it has performed its full operating function, and control during the assembling of equipment needed in the performance of subsequent operations during and after completion.**

This part contributes to the overall advantages of Gray completely coordinated Systems of Well Control.

Gray Casing Cutter

Gray Casing Rolling and Beveling Tool

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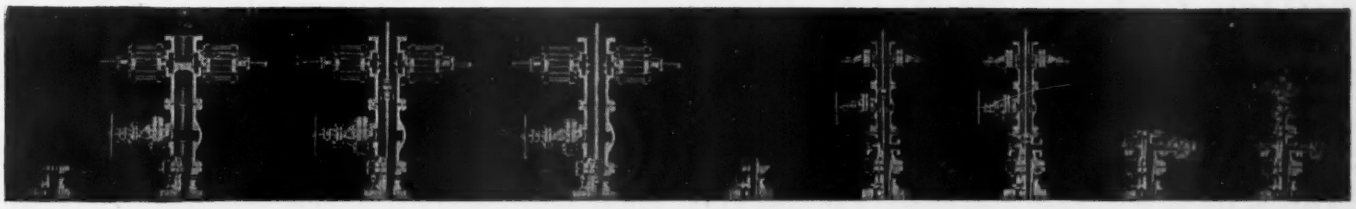

Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

☆ California

Kern County Record-Breaker Heading for 17,000 Feet

World's record well in Kern County heads for 17,000 feet; 2 other deep tests below 13,000 feet; Shell enters Trico gas field to drill 2 wells; gas test going down in untried area in Stanislaus County; Rio Vista extension test abandoned; East Los Angeles well undergoing tests.

Kern County: Indications are that Pacific Western Oil Corporation, whose National Royalties 1 in 5-26s-22e, 9 miles east of the Lost Hills field, on December 2 broke the world's depth record, will likely carry the well on down to at least 17,000 feet for a conclusive deep test. The operation has been remarkably free of trouble and good progress continues to be made at the rate of approximately 26 feet per day. The former world's record of 16,655 feet, was held by Phillips Petroleum Company's Schoeps 3 in Brazos County, Texas. Present depth is approximately 16,700 feet. The operator's objective is the Vedder sand, found productive in many parts of the San Joaquin Valley. The present distance of the bit from this objective is not being divulged.

Intention of California operators to thoroughly explore very deep oil possibilities throughout the San Joaquin Valley is evident from other deep tests now drilling, 2 of which are below 13,000 feet. Belridge Oil Company has cemented casing at 13,944 feet in its South Belridge field deep test, 62-W-33, and was drilling at about 14,000 feet. Richfield Oil Corporation's Coles Levee field deep test, C.L.-A 21-33, is drilling below 13,400 feet. Both are no dope holes.

Tulare County: Shell Oil Company has entered the Trico gas field for the first time and will drill 2 wells at the northwest end of the field. Locations have been staked for Alpaugh Unit 1 in 7-24s-23e and Alpaugh Unit 2 in 12-24s-22e. The latter is just over the line in Kings County. Principal operators in the field are Trico Oil and Gas Company and Standard Oil Company of California.

United Exploration Company spudded Monroe Ake 85-12, a wildcat, in 12-18s-23e, 2 miles north of the town of Goshen. General Petroleum Corporation set surface pipe in Moran 42-30, wildcat, in 30-22-26, 5½ miles east of Pixley.

Fresno County: The Texas Company will drill a wildcat in the Cantua Creek area, about midway between the Helm and Cheney Ranch fields. Location has been staked for Dahlgren 1 in 7-16s-15e. The general area has been intensively prospected, without results to date.

Outcome should be known soon of Union Oil Company's outpost test, S.P.L. 75-19 in 19-16s-17e, northwest of the Helm field, drilling below 7850 feet.

To the southeast, in the Turk Anticline area, The Superior Oil Company has abandoned K.C.D. 1 in 13-17s-16e after encountering no shows to 10,509 feet.

Stanislaus County: Superior is rigging up to drill Sinclair Community 1 in 5-5s-9e, wildcat gas test about 9 miles west of Turlock. Location is 2 miles south of a dry hole drilled into the Cretaceous at 6311 feet by Coast Exploration Company about 10 years ago.

San Luis Obispo County: Buaas Development Company has staked Jack 1, wildcat a mile north of the town of Cholame in 19-25s-16e.

Solano County: Shell's attempt to extend the Rio Vista gas field to the southwest has ended in failure. Dozier-Pressley 1 in 16-3n-2e has been abandoned at 8025 feet. All tests were wet.

Los Angeles County: Richfield Oil Corporation's Union Pacific Unit 3 in the East Los Angeles area, 16-2s-12w, is undergoing tests with bottom at 7660 feet. Company's townlot wildcat, Boyle Community 33-1 in 31-1s-12w, is redrilling at 4484 feet. Old depth is 5902 feet.

Republic Operator, Inc., Fee 1 in 13-5n-17w, the first of several wildcats to be drilled in the Castaic area, was spudded and is drilling below 1140 feet.

☆ Oklahoma

Rogers County Wildcat May Open Oil Pool in Inola Area

Wildcat in Rogers County may open new pool in Inola area; Seminole play continues in shallow sands; two wildcats staked in Cleveland County will explore Wilcox; outpost staked on old Walters field flank; gas-distillate shows in Maysville test; Wayne pool well shows distillate; Magnolia will drill deep wildcat in Coal County.

Rogers County: A new oil pool may be opened in the Inola area by the Big Bear Oil Company, subsidiary of the Big Bear Professional Football Team of Chicago. The Courtney 1, SE NE NE 21-19n-17e, after getting a small show of oil in the Arbuckle lime at approximately 1152 feet, found the Regan sand at 1172-76 feet. A good show of oil was found at that depth, and at total depth at 1199 feet, more oil was found. The test will be deepened to 1250 feet before testing.

Seminole Area, A play in the shallow Calvin (Pennsylvanian) sand is in progress around the newly-discovered East Holdenville pool of Hughes County, Greater Seminole area, where deeper Booch sand is also producing oil. The play apparently was touched off with the recent discovery by B. C. Deardorff, who opened Calvin sand production with Miller 1-A, SE SE SE 5-7n-9e, a twin well to Miller 1, which was the pool opener for production from Booch sand. A number of operators are drilling 2½-acre locations on the Calvin quests, with a Booch test in the center, thus making 5 wells on each 10-acre spot.

Cleveland County: Two wildcats

Wells Completed in United States in Week Ended November 30, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions and exploration shown in monthly summaries published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS This Week	Last Week	This Week 1945
Alabama	1					1							1	1	
Arkansas	3					3					2	2	5	8	4
California	24		1			25	1				7	7	33	33	27
Colorado	5					5							5	2	4
Florida														1	1
Illinois	25					9	34				10	10	44	44	35
Indiana	4				3	7							7	5	6
Kansas	22				5	27	1	2			3	5	33	41	48
Kentucky	3		1		2	6					5	5	11	16	19
Louisiana	4	1	1		3	9							9	48	29
N. Louisiana	2		1		1	4							4	28	10
S. Louisiana	2	1			2	5							5	20	19
Michigan	4		1		4	9				1	2	3	12	15	8
Mississippi	2				1	3					3	3	6	7	7
Montana	1		1			2							2	5	5
Nebraska															1
New Mexico	4		4			8					2	2	10	9	5
New York	15		11			26							26	28	25
Ohio	4		17		6	27					1	1	28	26	10
Oklahoma	24		3	2	10	39					15	15	54	86	44
Pennsylvania	29		8	15		52	1						53	52	44
South Dakota											1	1	1		
Texas	97	4	10	1	33	145	1		2	1	23	26	172	160	156
E. Tex. Bor. Co.'s	1		1			2							2	5	5
Rest of E. Texas	4		1		2	7					2	2	9	6	8
North Texas	22		2		18	42					5	5	47	40	58
W. Central Tex.	3		1		2	6					4	4	10	9	5
West Texas	34				4	38	1				2	2	41	45	29
Texas Panhandle	2		3		1	6							6	4	7
G. Coast, Upper	9	2	1	1	2	15			1		1	2	17	16	15
G. Coast, Lower	15	1	1		1	18			1	1	3	5	23	22	21
Southwest Texas	6				2	8					3	3	11	10	5
S. Central Texas	1	1			1	3					3	3	6	3	3
West Virginia	3		11		3	17							17	20	18
Wyoming	2				1	3							3	2	5
Total U.S.	276	5	69	18	80	448	4	2	2	2	74	80	532	609	501

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12

staked in Cleveland County are headed for the Wilcox sand zone. Faultline Oil Corporation et al have moved in for Hodan 1, NW SE SE 27-10n-2w, east flank of the old Moore field. The second test will be in 36-10n-2w, on leases recently acquired by the company at a State School Land Commission sale. Part of Faultline's block was acquired from Bartlett & Crum, Wichita, Kansas, which took the acreage early in the year. The Faultline company drilled a 7540-foot Wilcox sand failure at Fant 1-A, SW SW NE 27-10n-2w, earlier this year.

Cotton County: A 2500-foot test will be drilled in SE SE SE 5-2s-10w by Earl A. Benson and William V. Montin, both of Oklahoma City. The venture is on the south edge of the old Walters field.

Southwest Maysville Pool: The Carter Oil Company has found gas and distillate in the Pennsylvanian formation at the Southwest Maysville pool in Garvin County. Eskridge 2, NE SW SW 19-4n-2w, ran a drill-stem test at 6537-72 feet, and after 10 minutes, 60 feet of distillate were recovered. Crew was to drill ahead before further testing. This well may open distillate production within the oil-producing field if successfully completed from the above zone.

McClain County: Distillate has been discovered in McClain County's newest pool, the Southwest Wayne pool. Magnolia Petroleum Company's Kitchens 1, NW NE NW 25-5n-2w, flowed 50 barrels of 60-gravity distillate from perforations in the Hunton lime, from 6496-510 feet, and is making 2 million cubic feet of gas per day. The well previously tested distillate — in lesser amounts — from the Pennsylvanian zone.

Coal County: Magnolia plans a deep wildcat north of Tupelo, and northwest of the Centrahoma area. It is Hockett 1, NE SE NE 10-2n-8e, and will be taken to approximately 7600 feet. The location is north of an old well which was deepened in 1937 by Flint Russell, and abandoned as a dry hole at 2950 feet. The deepest test drilled in the township was Moore & Deaner's Edwards 1, NW NE SE 27-2n-8e, which was dry at 7336 in the Bromide.

Louisiana Allowable Set

The Louisiana Department of Conservation has set the December daily allowable crude production at 444,411 barrels, 4096 over the November figure. North Louisiana's daily allowable is 101,726 barrels, and that of South Louisiana 342,685 barrels.

☆ Kansas

Output Up, Wildcatting Down; Phillips County Test Quits

Oil output up, but exploratory work declining; Phillips County wildcat abandoned after weeks of testing; another failure registered in Brown County.

Oil production for Kansas has had a definite increase, although exploratory work has dropped off appreciably. Most new oil production is being brought in by already established pools. Bulk now is coming from Barton and Russell counties, with Rooks, Rice, Pawnee and Ellis counties contributing substantially. There has been a noted decline in wildcat drilling operations, although non-exploratory work has remained fairly steady. During the week approximately 25 tests were completed as commercial producers (none of them exploratory) for 10,597 barrels daily.

Phillips County: After many weeks of testing, Doley Oil Company has abandoned Henderson 1, wildcat in SW SW NW 23-10s-19w, a little more than a mile southwest of the Vohs pool. Topeka lime was topped at 3088 feet, Lansing lime at 3336, Kansas City lime at 3563, and Arbuckle lime at 3678. Oil stains were found at total depth of 3699 feet. The Lansing was tested through perforations but commercial oil production could not be developed.

Brown County: Stanolind Oil & Gas Company's wildcat in the extreme northeastern part of the state has been abandoned as a dry hole. Wikle 1, NW SW 10-2s-15e, 3 miles north of Fairview, was taken to 3435 feet before being abandoned. A trace of oil was recovered on a drill-stem test from 3036-102 feet.

☆ New Mexico

Production Test Under Way on On Hobbs Area's Deep Prospect

Production test underway on first deep test for Hobbs area; Eunice Townsite's Yeso pay to continue north; wildcat failures in Lea and San Miguel counties.

Lea County: Sun Oil Company's McKinley 1-B, deepened producer on the northeast edge of the Hobbs field, swabbed and flowed 72 barrels of fluid, including 2 percent bottom sediment and water, on 12-hour test after using 5000 gallons of acid in Clear Fork open hole at 7542-7658 feet. Development of the 3200-foot Bowers oil zone, heretofore confined to plugged-back wells, is likely to be pushed with vigor from now on. Amerada Petroleum Corporation is starting State 5-B, C SW NE 29-18s-38e, and others are expected to follow.

Barnsdall Oil Company and Magnolia Petroleum Company's Linam 1, C NE NE 29-21s-37e, north offset to the most northerly Yeso producer in the Eunice Townsite sector, was running pipe to complete after showing oil when tester was used at 6635-6660 feet. Amerada Petroleum Corporation's Corrigan 4, C NE NE 4-22s-37e, southeast of the townsite and adjacent to Ellenburger production, was testing Yeso perforations at 6542-66 and 6518-30 feet. These zones will be acidized, then the well will be perforated opposite the most effective pay at 6490-6512 feet. Amerada is starting Corrigan 7, south offset, to drill to the Ellenburger.

Wildcat Failures: Skelly Oil Company's Yadon 1, Lea County, 5¾ miles northeast of the Lovington field, was abandoned at 5762 feet, having recorded low structural position in entering the San Andres at 4938 feet. In San Miguel County, Phillips Petroleum Company's Leatherwood 1, 2-15n-18e, quit at 2768 feet in granite, topped at 2690 feet with elevation of 6963 feet.

☆ West Texas

Isolated Coke County Wildcat To Make Commercial Oil Well

Coke County's isolated wildcat will make commercial oil well; minimum of 100 Clear Fork wells will be drilled as result of the linking of the Fullerton field with South Fullerton-Devonian and Coopwood areas; prolific oil flow from Silurian recorded on south end of the TXL field.

Coke County: Sun Oil Company's Jameson 1, 18½ miles west of the dormant Blackwell pool, nearest production, filled 1000 feet from surface with oil and rotary fluid when deepened to 6245 feet in Crinoidal (Pennsylvanian), topped at 6200 feet with elevation 2080 feet. The well was being swabbed to try for natural flow. The gas zone was excluded in cementing 7-inch pipe at 6225 feet. This wildcat was scheduled to explore the Ellenburger, but will be completed in the Crinoidal if commercial production is obtainable, then start a new test for the deeper zone.

Crockett County: T. W. Loffland and J. M. Loffland, Jr.'s Cox 1, C NW SW Sect. 40, Block ST, T.C. Railway and E. Foster Survey, was drilling unidentified dolomite at 10,610 feet with the Ellenburger due near this level. A drill-stem test of the Joins (Simpson) at 10,164-219 feet proved dry, although formation samples carried nominal oil staining and porosity.

Wildcats: Humble Oil & Refining Company's Sawyer Cattle Company 1-C, Reagan County and third Ellenburger test for the company's 171,431-acre lease, was making caliper survey in lime at 9907 feet. In Presidio County, Argo Oil Corporation's Mitchell-State 1 was drilling sand and shale at 9070 feet, and possibly still in the Pennsylvanian. In Winkler County, Amon G. Carter et al's Wight-Gulf 1, C SW SW PSL 29, Block 40, and 1½ miles southwest of a 7006-foot Clear Fork failure, entered barren Yates at 2670 feet, or 23 feet low, and

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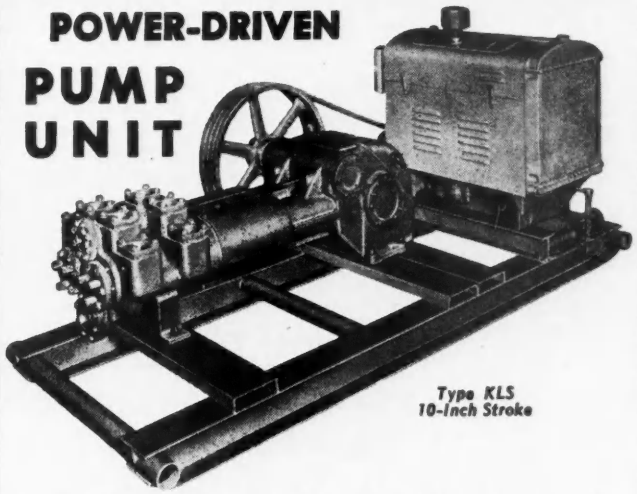

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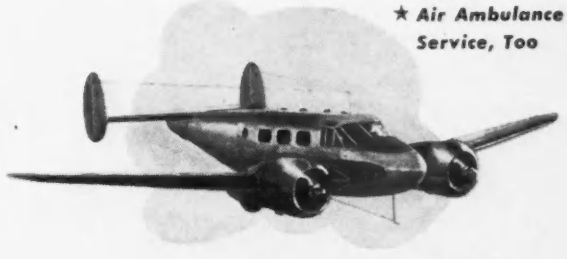

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was drilling at 3850 feet. Santa Fe Petroleum Company's Wheeler-Magnolia 1, same general area, was drilling lime and shale at 7815 feet.

Andrews County: Santolind Oil & Gas Company's Brooks 1, SE NE PSL 9, Block A-48, a mile southwest of the Fullerton field proper and ⅝ mile northwest of the Fullerton "8500"-Devonian field, proved more than a score of locations for Clear Fork production in recovering 800 feet of oil- and gas-cut mud and 4000 feet of oil when tester was used at 6799-6809 feet. The well yielded gas to surface within 6½ minutes for a daily rate of 300,000 cubic feet. Pipe has been cemented at 6820 feet for completion at 7176 feet. This well serves as a connecting link for Clear Fork production being developed along a north-south trend for 3 miles to the south, thence 3 miles southeast and across the South Fullerton-Devonian field. The Clear Fork is not productive in the Fullerton "8500"-Devonian 28-well area, but is present throughout and overlaps the South Fullerton-Devonian 12-well area.

Stanolind's Lotus 1-E, C NW SW PSL 16, Block A-48, indicates that the Clear Fork pay trend, sweeping south from the Fullerton field proper, will have a minimum width of 1 mile, as this outpost flowed 47 barrels of oil on 17-hour preliminary test through ¼-inch choke from open hole at 6798-7125 feet. The company's Lotus 1-D, C NE NE PSL 24, Block A-48, passed up Clear Fork production, and entered the Devonian at 8765 feet, or 140 feet low to the north offset, and was drilling dry lime at 8850 feet. It will be plugged back for completion in the Clear Fork.

Discovery: Humble's Sims 2, C NE NE PSL 25, Block A-39, and 3⅛ miles northwest of the Nelson 1-well pool on almost identical production contours, was preparing to perforate pipe cemented on bottom at 10,535 feet in Ellenburger, topped at 10,400 feet. Drill-stem tests at 10,492 feet and at 10,535 feet in dolomite, topped at 10,458 feet, confirmed high-gravity oil production, but subnormal in pressure and gas yield.

Dollar Hide Field: Lion Oil Company's Cowden 1, C NE NE PSL 6, Block A-55, southwest offset to the most westerly producer in the field, entered the Devonian at 7901 feet, or 218 feet low, but flowed 46 barrels of oil in 2½ hours through tester at 7935 feet. It will drill through the pay before running pipe. Low structural position of this well makes it doubtful if explorations will continue west in this immediate area.

Ector County: American Republics Corporation's TXL 1, ⅝ mile southeast of the Murchison pool Devonian pumper, is due to be plugged back to the Devonian, topped at 8377 feet, or 116 feet high, after eliminating deeper beds in testing sulphur water at 10,712-736 feet in Ellenburger, topped at 10,716 feet. Phillips Petroleum Company's Millard Unit 1, ⅞ mile south by west of the discovery and structurally low, was drilling lime at 9790 feet.

Humble's Cowden 1-F, C NE SE T&P 11, Block 45-T-2-N, ½ mile south of its prolific Ellenburger discovery for the Andector area, cemented pipe on bottom at 8690 feet after reaching sulphur water in last 30 feet of section, and will complete through perforations. The Ellenburger was entered at 8570 feet, being 31 feet low, but tested oil flow at 8625 and 8660 feet, with oil and water flow at 8660-90 feet. The Ellenburger pay is expected to embrace considerable area, with above average crude yield per acre for this dolomite.

Rowan Drilling Company's Parker 2, east offset to the most southerly Devonian producer in the TXL field, with oil and water showing in this zone, flowed 243 barrels of 40-gravity oil, with gas-oil ratio 837/1, when tester was used at 8419-8500 feet in the Silurian, topped at 8090 feet. The Silurian has yielded comparable flowing production through tester, but heretofore has been passed up to complete in the Ellenburger. Parker 2 was drilling at 8960 feet, and may continue to the Ellenburger before setting pipe for completion.

☆ North Texas

Clay County Has Ellenburger Find on Buffalo Springs High

Clay County has Ellenburger discovery on the Buffalo Springs high; second Bend conglomerate producer confirmed for East Henrietta area; 2 offsets given recent Wilbarger County discovery.

Clay County: Continental Oil Company and Edge Oil Company's Roscoe Scott 1, northwest corner of Sect. 3239, TE&L Company Survey, and 1⅛ miles southeast of the partnership's 6500-foot Simpson discovery pumper for the Buffalo Springs geophysical prospect, was making production test of Ellenburger pay at 6495-6515 feet. Two drill-stem tests yielded sufficient oil and gas to indicate a commercial producer before landing oil string at 6485 feet. Scott 1 entered barren Bend at 5794 feet, or 61 feet low to the pumper, but due to the

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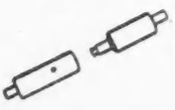

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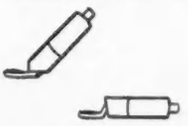

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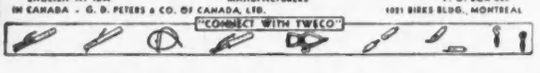

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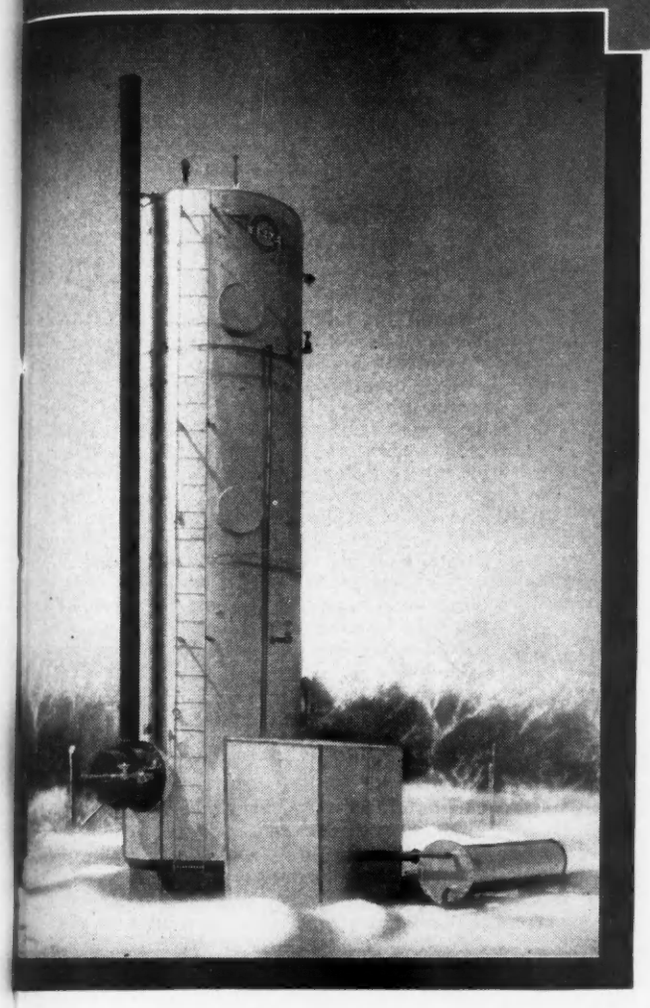

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thinning of the Barnett and Simpson beds the Ellenburger was found to be 122 feet high in entering same at 6479 feet, with elevation 1049 feet. This erratic condition heralds a small productive area.

Jack Grace et al's Bryant Edwards 1-B, S. C. Beldon Survey and southeast offset to their recent prolific Bend conglomerate discovery for the East Henrietta field, was showing considerable oil and gas through drilling mud while trying to cement liner at 6061 feet. This well was standing by for completion as a pumper in the 5500-foot Strawn when the second test found the deeper zone, and was deepened with rotary. A third test, offsetting both wells, is under way.

Wilbarger County: Amerada Petroleum Corporation and The Texas Company are starting west and north offsets, respectively, to the Canyon flowing discovery recently completed by National Associated Petroleum Company and The Texas Company on the Crouch 80-acre tract, and 6 miles southwest of the Odell field.

Paradise Oil Company, operating unit of the W. T. Waggoner Interests, was perforating opposite Canyon oil pay at 3156-74 feet after plugging back from 4964 feet in barren Ellenburger, topped at 4780 feet, or 77 feet low to a 4730-foot failure ¾ mile north by east.

Wichita County: Consolidated Oil Company's Wade 2, Labor 6, League 2, Denton County School Lands, established first shallow production for the Madden deep area, in pumping 62 barrels of 42-gravity oil and 48 barrels of water initial from sand at 1297-1322 feet.

☆ East Texas

Smith County Has Oil Strike In Paluxy Near Mount Sylvan

Smith County has oil discovery in Paluxy near Mount Sylvan field; Flynn Dome in Leon County assured of 3 widely separated Woodbine producers and additional development scheduled; new pay discovery in Norman-Paul pool has natural flow.

Smith County: Delta Drilling Company's Boynton-Magnolia 1, J. J. Smith Survey and 2 miles east by north of the Mount Sylvan 2-well field, was drilling at 7690 feet after indicating commercial production from the Paluxy series, topped at 7475 feet with elevation of 528 feet. This wildcat recovered 4000 feet of 33.5-gravity oil and headed while pulling drill pipe when tester was used at 7514-19 feet. Top of the oil pay was called at 7512-14 feet and bottomed at 7523 feet. Water was indicated in samples at 7611-15 feet. The pay thickness is thinner than normal for the Paluxy. This strike involves a separate and lower structure than the Mount Sylvan field which is partially defined by 4 failures.

Wood County: Sun Oil Company's Clanton 1, Allen Davey Survey and 1694 feet southwest of the Woodbine pumping discovery for the Norman-Paul field, established a new and shallower pay in flowing 7 barrels of 28-gravity oil, with gas-oil ratio 300/1, hourly through ¼-inch choke from Sub-Clarksville sand perforations at 4833-50 feet and 4854-58 feet. Additional pay prevails above these perforations. Clanton 1 was plugged back from 5562 feet in Woodbine, topped at 5284 feet with elevation 445 feet. The pay section of the latter was faulted out. This sub-Clarksville producer raises the possibility of the Norman-Paul area being connected to the Merigale field on the southwest and of the same fault plane.

Amerada Petroleum Corporation et al's Coke Unit 2, Coke field Smackover prospect, was drilling at 8998 feet in the Travis Peak, topped at 8345 feet. Humble Oil & Refining Company's McKnight 1, northeast edge of the Hawkins field and with the same objective, was drilling sand and shale at 10,050 feet.

Cherokee County: Standard Oil Company of Texas' New Birmingham 1, G. E. Looney Survey and 10 miles southeast of the Boggy Creek field, was drilling sand and shale at 9510 feet. This wildcat passed up promising gas production in the Bacon and James zones.

Leon County: United North & South Development Company's Oden 1, W. Martin Survey and 2¼ miles east by north of Claude Bell's Browne-Carson 1, discovery Woodbine pumper for the Flynn area, flowed oil, gas and muddy water during preliminary test of perforations at 6887-7337 feet in Woodbine, topped at 6900 feet with elevation 549 feet. The perforations have been squeezed, and new perforations will follow. Oden 1 is high for the area, and made an unsuccessful test of the Edwards at 7780-8111 feet.

Daniel Oil Company's Cox 1, John Scritchfield Survey and 1½ miles west by north of the discovery, was lowering tubing after heading oil and rotary fluid from perforations at 7036-7428 feet. A commercial producer is confirmed when the hole is cleaned of mud. This well entered the Buda at 7404 feet, and is credited with having logged oil pay in drilling to 7444 feet, thus accounting for perforations having been made at 7416-28 feet. Woodbine production is from thin streaks of sandy shale.

Development of the Flynn area may attain substantial proportions during the next year. United North & South Development Company has scheduled a test on its Holloman lease near the Daniel Oil Company's producer, while Tex Harvey Oil Company has contracted to drill on the Barney Lamb tract, John Scritchfield Survey and ½ mile southeast of the Daniel well. Claude Bell has announced plans to deepen the discovery, which averages 8 barrels of 35-gravity oil daily from Broken Woodbine at 7185-7303 feet.

Houston County: John Ivy and Moran's Murry 3, John Durst Survey, was abandoned in Paluxy at 9551 feet. This wildcat logged Woodbine at 7883 to 8504 feet, duplicating the thick section encountered by a previous Woodbine failure on the lease.

Harrison County: Arkansas Fuel Oil Company's Genevieve O'Banion 2, west offset to O'Banion 1, Waskom area, was being rigged up. This operation was reclassified a year ago when, after producing gas dually for 4 years it began Travis Peak oil production.

Atlas Oil & Refining Company, C. M. Beckett and T. P. Smith, Jr., were preparing to spud Minerva Cooper 2, offsetting Minerva Cooper 1, completed at 5935 feet as a southwest extension of flush oil production in the Waskom area. Minerva Cooper 1, Simpson Holloway Survey, showed for a good oiler, gauging 147.12 barrels of 40.5-gravity oil daily on 3/16-inch choke.

☆ Southwest Texas

Kelsey Field Area Strike Yields Good Flow on Test

Discovery in Kelsey field area has good flow on initial test; pumping equipment being installed at discovery in Seven Sisters field area; gasser completed at Palangana salt dome.

Starr County: A discovery for this area is Daubert & Achning's Villareal 1, wildcat 1¼ miles southeast of Kelsey field and 1½ miles east of South Kelsey field. From perforations at the 5900-foot level the well flowed 12 barrels of oil through 5/32-inch choke the first hour

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and it was estimated the well would make 288 barrels per day through the same choke. Total depth is 5956 feet with 5½-inch casing set near the bottom. A drill-stem test previously made at 5926-36 feet recovered 1100 feet of oil in 20 minutes with 156 pounds working pressure and 2500 pounds bottom hole pressure.

Duval County: J. C. Palmer's Welder Heirs 1, new discovery a mile west of Seven Sisters field, is installing pumping equipment after swabbing clean oil. Total depth is 2600 feet with 5½-inch casing set on bottom. The well is perforated for completion at 2589-2600 feet in the Mirando sand, topped at 2596 feet. A drill-stem test at 2596-2600 feet recovered 220 feet of oil, 180 feet of oily mud and 60 feet of mud in 15 minutes.

H. H. Howell has completed Singer Estate 2-A as a gas well on the southeast flank of Palangana salt dome. No gauge has been made of the flow. Total depth is 1759 feet with 5½-inch casing set to 1732 feet and perforated and completed in the 1600-foot gas sand.

Texas AIME Sections to Meet With Students at Austin

Texas local sections of AIME will meet at Austin December 18-19 as guests of petroleum engineering students at the University of Texas. Herbert Poyner, chairman of the University's student group, will be toastmaster and Everette L. DeGolyer will speak on "Early Oil Experts." Two of the 12 papers to be presented are by students at Texas University and Texas A. & M. College and will be placed in competition for a cash prize offered by the Gulf Coast Section. The following papers scheduled for the meeting were assembled by a committee headed by F. B. Plummer and George H. Fancher:

"Gas Conservation Practices in West Texas," by D. V. Carter, Magnolia Petroleum Company, Dallas.

"The Utilization of Residue or Oil Well Gas in Connection with the Texas-California Gas Pipe Line," by W. K. Davis, El Paso Natural Gas Company, El Paso.

"Gas Developments and Trends in South Texas," by C. R. Williams, vice president, The Chicago Corporation, Corpus Christi, Texas.

"Valuation of Gas Condensate Reservoirs for Cycling," by W. H. Justice, Tide Water Associated Oil Company, Houston.

"A Reservoir Study of the West Edmond Hunton Pool, Oklahoma," by Max Littlefield, L. L. Gray, and A. C. Godbold, Gulf Oil Corporation, Tulsa.

"Our Auxiliary Petroleum Reserves," by H. H. Power, chairman, Department of Petroleum Engineering, University of Texas.

"Salt Water Injection and Pressure Maintenance in the East Texas Field," by Winfield S. Morris, vice president, East Texas Salt Water Disposal Company, Kilgore, Texas.

"What Management Expects of an Engineer," by A. C. Rubel, vice president, Union Oil Company of California, Los Angeles.

"What Engineers Expect of Management," by Ernest K. Parks, consultant, Los Angeles.

"The Calculated Effect of Pressure Maintenance on Oil Recovery from a Solution Gas Drive Reservoir," by Robert L. Hoss, graduate student, University of Texas.

"Gas Conservation—a General Plan," by William G. Gill, Petroleum Engineering Student, A. & M. College of Texas.

"The Engineer as a Supervisor," by Thomas C. Frick, The Atlantic Refining Company, Greggton, Texas.

"Corrosion in High Pressure Gas Condensate Wells," by Jack W. Waechter, Petroleum Engineering Student, University of Texas.

☆ South Central Texas

Crystal City Wildcat Tests For Completion as Oil Well

Crystal City wildcat testing for oil production; 2 new tests located in Charlotte southeast extension area; Edwards

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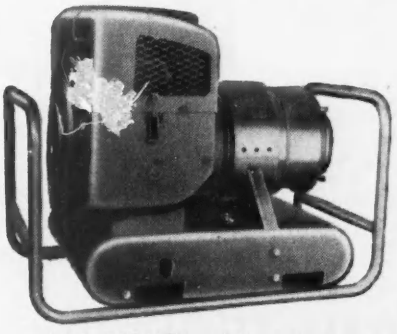

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ONAN ELECTRIC PLANTS

County wildcat flows gas on drill-stem test.

Zavala County: The Texas Company's Northeast Farming Company 1, wildcat 6 miles northwest of Crystal City, is testing for completion as an oil well. Cable tool rig has been moved in and is bailing. Total depth is 3372 feet with 7-inch casing set to 3300 feet for open hole completion. Four drill-stem tests have been made in the hole. At 3303-08 feet the drill-stem test developed 20 pounds working pressure in 15 minutes with bottom-hole pressure 200 pounds flowing and 1000 pounds shut in. A test at 3306-18 feet developed 36 pounds working pressure in 30 minutes and recovered 30 feet of gas-cut mud. A drill-stem test at 3350-57 feet recovered 15 feet of oil-cut mud with a slight blow in 45 minutes. The last test at 3357-72 feet recovered 20 feet of oil-cut mud with 9 pounds working pressure in 45 minutes.

Atascosa County: Two new tests in the growing southeast extension area of Charlotte field are The Texas Company's Dennis H. Thompson 1 and Humble Oil & Refining Company's E. M. Chylek et al 2. There have been 3 wells completed in this extension area.

Edwards County: Shell Oil Company's J. H. Brown 1, wildcat 5 miles northeast of Rock Springs, flowed gas on drill-stem test at 4550-4630 feet and developed 1200 pounds working pressure in 15 minutes. A previous drill-stem test at 4560-62 feet recovered gas-cut salt water and flowed gas. Bottom-hole pressure flowing was 300 pounds and shut in 600 pounds. The test is being deepened to the Hickory. Ellenburger lime was topped at 4350 feet.

☆ Lower Texas Coast

Cabeza Creek Field Has First Commercial Pettus Sand Well

First commercial Pettus sand producer at Cabeza Creek completed; new discovery likely in Stewart and Ganado area; southwest extension well at Strauch-Wilcox testing Pettus sand.

Goliad County: Continental Oil Company has completed J. E. Pettus et al 11 as the first commercial Pettus sand producer in the Cabeza Creek field. On potential the well flowed 191 barrels of 46.1-gravity oil daily through 11/64-inch choke with gas-oil ratio 787/1. Production is from perforations at 4528-33 feet in 6-inch casing set to total depth of 7845 feet. This well was drilled to the Wilcox, regular pay zone for the field, before going back to the Pettus for completion. A drill-stem test in the Wilcox at 7617-37 feet was dry.

Jackson County: New discovery prospect for the Stewart and Ganado field areas is Blanco Oil Company et al's John Lind 1, wildcat 1 mile southeast of Stewart field and 1 mile southwest of Ganado field. A drill-stem test at 7058-60½ feet with 2500-foot water cushion started flowing in 15 minutes and developed 1425 pounds working pressure, using ¼-inch chokes, and recovered 720 feet of oil and 1600 feet of salt water after being open 41 minutes. Total depth is 7400 feet with 5½-inch casing set to 7370 feet.

Bee County: Mills Bennett's C. G. Rice 1-A, southwest extension area of the Strauch-Wilcox field, is testing for completion as a Pettus sand well. Total depth is 4068 feet with 5½-inch casing set on bottom. The Pettus sand was topped at 4033 feet and a drill-stem test at 4039-43 feet recovered 10 feet of oil and 10 feet of mud cut with oil and developed 13 pounds working pressure. A drill-stem test at 4039-68 feet recovered 105 feet of mud cut with oil, 150 feet of oil, and 120 feet of salt water, all in 45 minutes.

Goliad County: Sun Oil Company's Emil Els 1, outpost at Boyce field, is drilling below 7093 feet after making a successful drill-stem test in the Pettus. Located 5700 feet west-southwest of The Atlantic Refining Company's Altman 2, Els 1 was drill-stem tested at 4193-4203 feet.

☆ Upper Texas Coast

Harris County's North Katy Field Given New Producer

New completion at North Katy; activity in Galveston Bay increasing; Ramsey field southwest extension try fails; wildcat in Hutchins field area dry; wildcat between Angleton and Baileys Prairie fields may be gasser.

Harris County: A new completion for the North Katy oil field is Houston Oil Company's Emma Waterwall et al 1, east side of production. The well flowed 110 barrels of 40.7-gravity oil daily on potential, flow being through 6/64-inch choke with 1200 pounds flowing pressure on tubing and gas-oil ratio 830/1. Total depth is 6909 feet with 5½-inch casing set on bottom and perforated for completion at 6839-41 feet.

Chambers County: Activity in Galveston Bay is increasing, with 4 active tests under way in the Bay at present and 8 locations announced. Humble Oil & Refining Company has 3 tests drilling, 1 a wildcat in the Smith Point area and the other 2 in Redfish Reef field. The other active test is Standard Oil Company of Texas et al's field test at Cedar Point. Humble has announced location for 5 tests in Redfish Reef field and 1 test at Cedar Point. Standard et al have located 2 other tests at Cedar Point.

Colorado County: A 4000-foot southwest extension test at Ramsey field is a failure. The dry hole is Tide Water Associated Oil Company's Gust Goeckler 1, W. D. Ramsey Survey and 4000 feet southwest of Cities Service Oil Company's Stephens 1 gas-condensate well. Total depth is 10,838 feet with no production tests made.

Wharton County: D. M. Wallace's J. W. Kubela 1, wildcat about a mile east of production in Hutchins field, is a dry hole. A number of tests were made after drilling to 6000 feet and setting 5½-inch pipe to 4710 feet. On latest tests, through perforations at 4669-73 feet, the well flowed 75 barrels of fluid daily through 6/64-inch and ¼-inch chokes, showing 10 percent salt water, the remainder being 26.2-gravity oil. The salt water flow increased and attempts to shut it off failed. Other tests made in the hole recovered salt water.

Brazoria County: McCarthy Oil & Gas Corporation's Marie B. Nickell 1, wildcat between Angleton and Baileys Prairie fields, may become a gas discovery well. No details have been released, other than that tests are being made in the hole. Total depth is 12,007 feet with 7⅝-inch protection pipe set to 10,760 feet and liner run below that.

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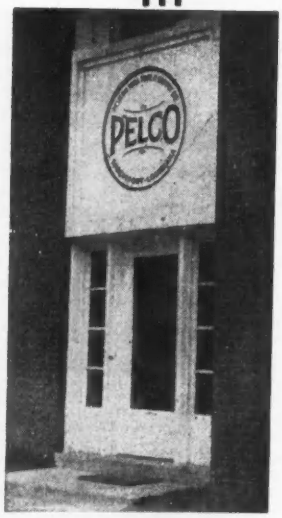

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☆ South Louisiana

Evangeline Parish's Mamou Field Has 11th Producer

Eleventh producer in new Mamou field completed; new gasser completed at Fresh Water Bayou; new Tuscaloosa sand test located at Big Island; new sand discovered at Lirette.

Evangeline Parish: A new completion for Mamou field is Magnolia Petroleum Company's Linzy Morein 1, 2 miles east of the discovery well, in 3-5s-1e. On potential it flowed 100 barrels of 48.2-gravity oil daily through 6/64-inch choke with 4500 pounds tubing pressure and gas-oil ratio 6018/1. Total depth is 11,905 feet with casing perforated at 11,604-612 feet for completion. Eleven oil wells have been completed in this field and 2 dry holes. One dry hole is Delta Drilling Company's Federal Land Bank of New Orleans 1, located at Mamou townsite, 1½ miles west of the discovery well. The other dry hole is Magnolia Petroleum Company's Lahaye Brothers 1, located in the southeast corner of SE¼ NW¼ of 6-5s-1e. It is being used as a salt water disposal well.

Vermilion Parish: Union Oil Company of California's Louisiana Furs 4-C has been completed as a new deep gas well in Fresh Water Bayou field. No gauge of the flow has been made, the well having been shut in after perforating for completion and is waiting on state potential test. Total depth is 13,941 feet and casing is perforated at 11,535-555 for completion. This well is 2200 feet north and 1500 feet east of the No. 1-C well.

Rapides Parish: The Tuscaloosa sand play in central Louisiana is gaining momentum with the location of a new test in Big Island field, site of the recent Tuscaloosa discovery in this locality. The new test is Renwar Oil Corporation's L. E. McNeely 1, ¼ mile due west of Union Producing Company et al's Belgard 1, Tuscaloosa sand discovery for the field. Union Producing Company is drilling another test in the field at present and Lynn Oil Company has located a wildcat 2½ miles northwest of Big Island field. Belgard 1 was completed for a potential of 361 barrels of oil daily through 3/16-inch choke from perforations at 9714-22 and 9684-9700 feet. The Tuscaloosa was topped at 9260 feet.

Terrebonne Parish: Humble Oil & Refining Company's LaTerre Company, Inc., 5 has discovered a new gas-condensate producing sand at Lirette field. On flow test the well gauged 84 barrels of 51.6-gravity condensate daily through ¼-inch choke and 6,312,000 cubic feet of gas. Pressure on the tubing flowing was 3200 pounds and shut in 3600 pounds. Total depth is 10,580 feet with 7-inch pipe set to 10,570 feet and perforated opposite the new pay sand at 9606-24 feet.

☆ North Louisiana

Delhi North Outpost Coring; Chatham Deep Test Plugs Back

Delhi north outpost test coring; Chatham field deep test plugged back; Catahoula Parish wildcat swabbing without oil shows.

Richland Parish: N. H. Wheless Com-

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pany's Richland Parish School Board 2, C NE SW 16-17n-9e, which is three 40-acre locations north of Delhi production, is coring at 3186 feet. This is one of the first tests north of the trend of the field. It is also 1½ miles northeast of Gulf Refining Company's Prudential Insurance Company of America F-1, SW NW 20-17n-9e, which has been testing in the Paluxy sands. It recently produced .62 barrel of 33.1-gravity oil per hour on a 3-hour test with a high gas-oil ratio of 23,700/1, which operators are attempting to correct.

Jackson Parish: Shell Oil Company's deep test, Tremont Lumber Company 3, 21-15n-1w, Chatham field, after going to 12,317, plugged back to 9866 feet. Perforations at 9820-44 feet when tested flowed 2,125,000 cubic feet of dry gas, and were acidized to increase the flow. Operators may perforate at 9208-24 feet.

Bossier Parish: Barnsdall Oil Company-Sohio Petroleum Company's Maston Nance 1, 23-23-13, new Plain Dealing shallow field, was drilling chalk below 2615 feet. W. K. Rowe's E. W. Hardy 1, wildcat in 10-23-13, several miles north of the Plain Dealing discovery, Carter Burton 1, is drilling below 492 feet.

Catahoula Parish: Lyons & Prentiss-Penrod Drilling Company's wildcat, P. L. Mitchell 1, C NW NW 36-8n-7e, which had shows of oil in the "Pilot" sand of the Tuscaloosa, is swabbing perforations at 9330-34 feet without shows. The well went to 9471 feet. Further perforations and test will be continued.

AIME to Meet

"Our Labor Problems and What We Can Do About Them" will be the main topic at the December 10 meeting of the Gulf Coast Section AIME in the Texas State Hotel at 6:30 p.m. The principal speaker, Tom Davis, a member of the law firm of Baker, Botts, Andrews & Walne, will present some of the legal angles in the nation-wide controversial subject and give his views on a practical approach to the problem.

☆ Arkansas

Wildcat West of Village Field Makes 44-Barrel Producer

Wildcat west of Village field, Columbia County, makes 44-barrel producer; Nevada County well plugged; Ouachita County well on pump.

Columbia County: McAlester Fuel Oil Company's Alexander A-1, NE SE 17-17-19, 1 mile west of Village field production, was gauged at 44 barrels daily from the Travis Peak through perforations at 4333-38 feet. This wildcat was completed several days ago.

McAlester Fuel Oil Company's R. A. Wynn 1, wildcat in 8-16-19, completed some days ago at 3500 feet, is still awaiting pump. The test, 5 miles northeast of McNeil, was drilled to 6800 feet. Atlas Oil Refining Company's Longino-Goode 1, NW SE 34-17-23, is drilling below 9247 feet after core was taken at 9216 feet

Nevada County: The Carter Oil Company was using cable tools in readying for completion its E. L. Holloway 1, NE SW 17-14-21. Completion of this well north of Willisville will be around 1300 feet after drilling to 2184 feet.

Ouachita County: Turner & Coan's Ritchie A-2, SW SW SW 19-15-18, was completed, and failing to flow, is being put on the pump with no estimate of production announced. Casing was perforated at 2840-66 feet in the James lime.

☆ Mississippi

Adams County Prospective Strike Has Water Trouble

Adams County prospect troubled by water; Cranfield field given big producer; Brookhaven field extension try promising; Forrest County deep wildcat still testing.

Adams County: Phillips Petroleum Company's Mrs. Vic Artman 1, 36-8n-2w, wildcat about 6 miles northeast of Natchez which has shown good indications of making a commercial producer, continues to test after running into trouble with salt water. Originally the well had established production from 16 perforations at 5618-22 feet in the Wilcox zone and on an early test flowed approximately 6 barrels an hour for a short period. But subsequently salt water began producing and finally amounted to 90 percent of production before the well died. When the well started flowing again production amounted to 9 barrels of fluid per hour, 36 percent salt water.

Phillips encountered similar trouble on Davey 1 in 46-8n-2w, which made a failure early last spring. The Davey was driven to the Massive sand zone and attempted to establish production at 10,035-45 feet. Commercial quantities of oil were obtained but extensive reworking failed to eliminate heavy intake of salt water and the well was finally abandoned. In this well however, no appreciable shows of oil were reported from the Wilcox zone.

In the Cranfield field Gulf Refining Company's Ella G. Lees 9, NEc 70-7n-1w, has been completed as one of the biggest producers in the field. On initial production test it flowed 316 barrels of oil in 15 hours through 3/16-inch tubing choke.

Lincoln County: Crescent Drilling Company's J. F. Vernon 1, SEc 31-8n-7e, trying to extend Brookhaven field production ¾ mile northwest, is cleaning out hole after recovering tubing which had twisted off. The well has good possibilities of making a producer but has experienced some trouble with salt water. Casing was perforated at 10,463-86 feet opposite the Massive sand zone and after flowing oil for 6 hours the well died. Later swabbing produced oil, mud and salt water.

Roeser & Pendleton's J. Wroten 1, NW SW 20-7n-7e, outpost ¾ mile south of the Brookhaven field, is waiting on cement after setting production string to 10,583 feet. The well is understood to have encountered encouraging results of Massive sand section at that depth and successful completion will add greatly to the field's known reserves. In the revived Mallalieu field where 3 tests are now drilling and 2 more prospects are in the planning stage, Humble's M. C. Randall 1, SEc 17-6n-8e, is preparing to set casing to 10,620 feet in the Massive sand zone after running electrical survey to that depth. Cores from 10,387-415 feet showed a fairly porous saturated sand section with indication that thickness extends well below that depth.

Holmes County: Mid-Continent Development Company's Sam D. Hall 1, SE SE SE 23-13n-3e, likely looking prospect in the northwest-central section of the state, is drilling below 5750 feet after running electrical log. Eutaw top was marked at 4398 feet but no shows were noted in the section.

Forrest County: The Superior Oil Company's Cassie Bradford 1, wildcat in SEc SW NW 1-3n-13w, is understood to be continuing with tests below 13,530 feet. The well is unofficially reported to have produced 38-gravity oil from that section. Morgan-Norton's U.S.A. 1, SE SW 15-1s-13w, wildcat, is drilling below 7652 feet with no shows reported so far. Marine Tuscaloosa zone was indicated at 7567 feet.

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☆ Ohio

Two Clinton Sand Gas Wells Found in Muskingum County

Salt Creek has 2 Clinton wells; Medina sand extension at Bridgeville; Mifflin extended north; Malta test a near failure. .

Muskingum County: The Wasson Company found gas in the Clinton sand in 2 wells which were headed for the Medina horizon in Sect. 21, Salt Creek Township. R. A. McConaha 2 reached the Clinton at 4088 feet and gauged 5½ million cubic feet at 4114 feet; and ¾ mile north Hiram Hutson 1 drilled through the Clinton, 4066-96 feet, and made 700,000 cubic feet at 4087.

Medina sand gas was found 1½ miles east of the field, at Bridgeville in Perry Township. Atha's 1 B. Baker 3, SW SW 11, had a natural gauge of 225,000 feet which after shot was shut in at 350,000 feet. Medina sand was logged at 4188-98 feet.

Ashland County: Roy Stewart's north offset to the M.W.C.D. 2, SW SE 14, Mifflin Township, came in at 2,100,000 cubic feet natural. Clinton sand, 2436-44 feet, showed some thinning which had resulted in a no-sand well ½ mile north.

Morgan County: The Industrial Gas moved 2 miles to the southeast of its Oil Springs pool for a deep test on Frank Northrup, NE NE 9, Malta Township. Clinton sand at 4256-99 feet had 300,000 cubic feet of gas but blew out and the Medina at 4352 feet had a hole full of water. Medina will be plugged off and the Clinton sand shot.

Mississippi Taxes Up

Mississippi petroleum tax collections are now running nearly $500,000 each month more than in 1945. From April through November cumulative collections have amounted to $13,074,912.81 compared with $9,451,319.47 for the same period last year.

☆ Illinois Basin

Hamilton County, Illinois, Devonian Test Disappoints

Shell's Devonian lime project in Hamilton County, Illinois, is disappointment; Wayne County wildcat swabs oil; Hancock County wildcat has show in Devonian; Prairie pool, Posey County, Indiana, has new pay horizon; North Princeton pool, Gibson County, has new pay zone; wildcat staked in Southeast Kentucky.

Illinois

Shell Oil Company's Nohava 4, SE SW NE 13-6s-5e, a test for Devonian lime production in the shallow producing Rural Hill pool, Hamilton County, is a disappointment. The Devonian was topped at 5105 feet but carried no commercial shows. Total depth is 5400 feet. Operators are running an electric log test before abandoning.

Wayne County: Perry Fulk's Ellis 1, wildcat in S½ NE NW 29-2s-9e, swabbed 20 barrels of oil per hour from Rosiclare at 3449-57 feet and is continuing to test.

R. B. Martin and Illinois Oil Company's French 1, SW SW SE 24-1n-9e, 1½ miles southeast of production in the Bennington pool, is drilling below 2900

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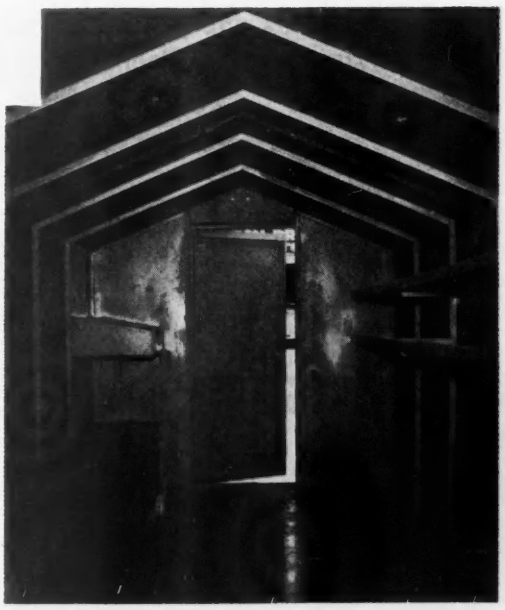

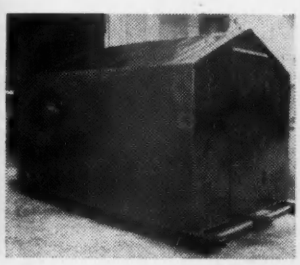

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feet and is reported running high enough structurally to produce.

Hancock County: Dale E. Lambert's Griffith 1, NW SE NE 26-7n-8w, a wildcat drilling with cable tools, encountered a slight show of oil in Devonian lime at 677-85 feet. Operator is drilling ahead.

Indiana

H. C. Detrick's Baker 1-A, NW SE NE 8-7s-14w, Posey County, has been completed in Mansfield sand at 1020-35 feet for 64 barrels of oil per day natural. The well opens a new horizon in the Prairie pool, which formerly produced from McClosky lime only.

Gibson County: George and Wrather's Beloat 1, NE NW NW 8-2s-10w, swabbed 25 barrels of oil and some water hourly from Cypress sand at 1820-40 feet to give the North Princeton pool a new pay zone. Operators are plugging back to shut off water. The pool previously had only McClosky lime production.

Kentucky

The Pure Oil Company and Stanolind Oil & Gas Company have located Hammons 1, 2-H-67, rank wildcat test in Clay County, Southeast Kentucky.

☆ Michigan

Oceana County Has Possible Traverse Lime Pool Opener

Oceana County has possible pool opener; pool opened from Michigan Stray sand in Mecosta County; 5000-foot test projected for Reed City field, Osceola County.

Oceana County: The Carter Oil Company's Miller 1, NE SW SW 11-13n-8w, logged Traverse lime objective at 1607 feet, and at 1629 feet showed 500 feet of oil in 2½ hours. Hole was standing full in 12 hours. Operator prepared to make a production test with promising pool opener in prospect.

Carter has an estimated 45,000 acres under lease in the western part of the county with a solid lease block in 3-mile radius of the well. Current prospect is the result of a 5-year survey originally based on sub-surface and old test correlations and a more recent core drilling campaign.

Mecosta County: Michigan Consolidated Gas Company's Stickler 1, C SW 15-14n-8w, 3 miles southeast of the old Austin gas field produced 1,600,000 cubic feet of gas from Michigan Stray sand at 1279-82 feet for a promising pool opener. Needing all available gas for the current winter, Consolidated expects to develop the area at once.

Isabella County: M. Bliss Keeler's Johnson 1, NW NW SE 32-13n-5w, 2 miles southwest of Fremont gas field, logged Stray sand at 1262 feet and carried 360,000 cubic feet of gas at 1266 feet before drilling into water. Test will be carried to 3700-foot Dundee section.

Osceola County: The Ohio Oil Company was preparing to spud Stedman 3, C NW NW 29-18n-10w, first projected 5000-foot test for the Reed City field. Richfield-Sylvania is the objective. The field was developed in 1940-41 for 3500-3600-foot Monroe oil production.

☆ Canada

Devonian Test to Be Drilled On Southeast Alberta Plains

Standard Oil Company of California and Imperial Oil, Ltd., have unitized a 32,000-acre block south of Foremost on the Southeast Alberta Plains and will drill a Devonian test. Likely depth of the well is 4300 feet. The test will be Foremost Province 13-17-5-11-4, located in the southeast 10 acres, Lsd. 8 17-5-11w4, in the center of a triangle formed by 3 earlier California Standard wildcats, all within 3 miles. Two of the wildcats drilled to the Madison lime and 1 to the Devonian, all encountering water. The new test is based on an indicated geological high.

Nine miles east of this venture, McColl-Frontenac Oil Company and Union Oil Company of California have started McColl-Union 6-12-5-10, in Lsd. 6 12-5-10w4, 10 miles northwest of the current limits of the Pinhorn gas field, proven in the past few months by McColl-Union, and 6 miles southeast of Foremost gas field, both producing from the Bow Island sand series at 2000-2200 feet.

Expanding its operations into more virgin territory in Central Western Alberta, Imperial Oil has taken up crown reservations between Chip Lake and Whitecourt, northwest of Edmonton and properties in the Wetaskiwin-Leduc area. This includes a new McColl-Frontenac and Imperial wildcat now drilling.

Two miles additional width to the 26-mile long Lloydminster Lone Rock oil field was indicated by the coring of 12-foot Sparky sand with oil saturation from 1858 feet at Community Services' 301 in Lsd. 11 31-48-2w3. The well has casing set to contact and will drill plug to determine potential shortly.

AMERICAN ROLLER BEARINGS HEAVY DUTY

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☆ Rocky Mountain Area

Carbon County, Wyoming, Prospect Has Gas on Test

Carbon County, Wyoming, prospect has gas on drill-stem test; Fremont County test in thick deposit of Mesa Verde at 10,640 feet; Continental's Elk Springs, Colorado, discovery makes 150-barrel pumper after shooting; Carter's Uintah County, Utah, wildcat develops gas; South Dakota test quits.

Wyoming

The interesting wildcat being drilled by Kerr-McGee and Phillips Petroleum companies on the Baggs structure, Carbon County, a mile north of the Colorado-Wyoming line, at Unit 1, C SE SE 10-12n-92w, made 3½ million cubic feet of gas on a drill-stem test. The sand was logged between 3771-3781 feet and was separated by a shale break from a sand at 3796-3810 feet, which made water on test. This well is now reported to be in the Fort Union formation of Eocene age and sands throughout this section have been lenticular and variable in other fields in Southwest Wyoming and Northwest Colorado. Numerous gas sands have been encountered in the Wasatch formation in this well and 2 sands have shown oil in cores but had no recovery on drill-stem tests. The well is projected for Frontier formation at depths estimated at 7500 feet.

Fremont County: General Petroleum Corporation's wildcat on the Antelope structure, NE NE SW 25-27n-94w, made only a few gas bubbles in 5 feet of mud recovered on test of the Frontier sand section between 8790-9078 feet. This section had shown gas in cores recovered 2 weeks ago. The well is 10 miles southwest of the Crooks Gap field, which produces 1500 barrels of oil daily from the Lakota sand. General Petroleum is now drilling below 9200 feet for the Dakota-Lakota sands which should be encountered within the next 500 feet.

Sinclair Wyoming Oil Company's Lysite test 75 miles west of Casper, which made water in a sand in the Mesa Verde formation at 10,440-10,475 feet, and was reported as possibly being completed at that depth as a gas test, is drilling below 10,640 feet. The well is Unit 1, NE NE NW 35-39n-91w, and is still believed to be in upper Mesa Verde after topping that formation at 6264 feet. If this correlation is correct, this is the thickest deposit of Mesa Verde formation ever drilled in the Rocky Mountain region, and the original objective of the test, Frontier formation, will probably be too deep for equipment on the well. This well has tested a total of 15 million cubic feet of gas in 2 sands in the Mesa Verde.

Colorado

Continental Oil Company's Weber sand discovery at Elk Springs, Moffat County, Colorado's only new discovery in 1946, looks to be about a 150-barrel per day pumper following shooting. Weber was topped in this well at 6087 feet and the sand was drilled to 6231 feet but water developed in the lower section and the well was plugged back to 6140 feet. The well swabbed 39 barrels natural in 14 hours and a 77-quart nitro shot was made. The first 24 hours after shooting the well swabbed 443 barrels, but the following 14 hours swabbed only 200 barrels, lowering the fluid. The well is Smith 1, NW SE SW 30-5n-98w, and Continental will soon install pump. This discovery is 40 miles northwest of the Rangely field, which produces 24,000 barrels daily from 170 wells in the Weber sand.

Utah

Gas has been developed in The Carter Oil Company's West Vernal wildcat at Davis 1, C NE NW 33-4s-20e (SLM), Uintah County. The well is the center of attraction in the Uintah Basin of Northeast Utah and Northwest Colorado, where a number of companies have conducted leasing and geophysical campaigns for 2 years. A drill-stem test at 5832-5870 feet, open 1½ hours, recovered an estimated 3 million cubic feet of sweet, dry gas. Shut in pressure was 1700 pounds. The sand is reported to be in the Mesa Verde contact zone, and the well may go as deep as Frontier sands at an estimated 9500 feet. Carter has cored this well through a majority of the section, and it is reported several shows of dead oil have been encountered, but this is the first evidence of active hydrocarbons.

South Dakota

J. E. Dyer et al's wildcat at Hell Canyon, just across the Wyoming-South Dakota state line, in Custer County, is being abandoned after making water in the Minnelusa formation in a sand topped at 845 feet. The well is Gov't. 1, SW NE SW 30-5s-2e.

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EXPLORATORY COMPLETIONS

ARKANSAS WILDCATS

Lafayette County—Failure: Sidney G. Myers, R. S. Allison, Tr.,—Crow Prod Co.'s T. C. Short 1, c ne se se 34-15s-24w, Chalk 2000, base Massive Anhy 3980, abnd 11-27-46 at 4015.

Little River County—Failure: K. E. Merren's Lewis 1, 330 fr nl 345 fr wl sw 1-13s-31w, base Annona 470, Paluxy 1532, base Massive Anhy 2508, Travis Peak 2953, abnd 11-5-46 at 3004.

CALIFORNIA WILDCATS

Kern County—Failures: William L. Hernstadt's Hernstadt 1, 24-27s-19e, Antelope Hills area, abnd 11-23-46 at 5650.

Mauer and Fisher's Corehole 1, 4-28s-29e, Mount Poso area, abnd 11-19-46 at 1019.

Western Gulf Oil Co.'s San Emigdio 5, 30-11n-22w, San Emigdio area, abnd 11-24-46 at 745.

Fresno County—Failure: Superior's K.C.D. 1, 13-17s-16e, Turk Anticline area, abnd 11-26-46 at 10,509.

Solano County—Failure: Shell's Dozier-Pressley 1, 16-3n-2e, Rio Vista area, abnd 11-24-46 at 8025.

Orange County—Failure: Tide Water's Norris 2, 8-6s-10w, Fairview area, abnd 11-26-46 at 6536.

Santa Barbara County—Failure: Union Oil Co.'s Williams B-1, 25-9n-33w, Cat Canyon area, abnd 11-28-46 at 2528.

ILLINOIS WILDCATS

Bond County—Failure: Sohio et al's Long 1, ne se ne 26-6n-5w, abnd 2768.

Champaign County—Failure: D. K. Roth's Reynolds 4, 1-22n-7e, abnd 292.

Clay County—Failure: Ralph Halbert et al's Stoops 1, s2 ne se 14-2n-5e, abnd 3051.

Jackson County—Failure: John E. Soper's Brown 1, ne nw ne 10-8s-4w, abnd 1437.

Jefferson County — Failure: Keating Drlg. Co.'s Nelson 1, se nw sw 11-1s-1e, abnd 2360.

Kankakee County — Failure: Illinois Drg. Co.'s Wilson 1, 24-30n-11w, abnd 264.

Richland County—Failure: Nat. Assoc. Pet. Co.'s Friend 1, sw sw sw 17-3n-6e, abnd 3076.

Wayne County—Failure: White Eagle O&R Co.'s Illinois Farm Corporation 1, sw sw se 15-1s-5e, abnd 3193.

White County—Failure: Arrow Drlg. Co.'s Turner 1, se se se 30-6s-9e, abnd 3209.

Williamson County—Failure: Frank Strickland's Biehl 1-A, w2 se sw 6-8s-3e, abnd 2725.

KANSAS WILDCATS

Ellis County—Oil Discovery: Texas Co.'s Dreiling 1, sw sw sw 15-13s-17w, flow 559 bbls fr Arbuckle 3560-83, td 3583.

Marion County—Failure: S. & S. Oil Co. et al's Ptacek 1, sw sw sw 20-19s-4e, abnd 2629.

Rush County—Failures: H. H. & B. Drlg. Co. et al's Werch 1, sw sw sw 6-16s-18w, abnd 3640.

Alkay Pro. Co.'s Greenwalt 1, ne sw sw 17-19s-16w, abnd 3845½.

Stafford County—Oil Discovery: Virginia Drlg. Co. et al's Roberts 2, c w½ sw sw 14-21s-12w, pump 35 bbls fr Arbuckle 3546-69, td 3569.

KENTUCKY WILDCATS

Grayson County—Failure: Ashland O&R Co. et al's Willis 1, 21-K-37, abnd 2601.

Henderson County — Failure: McCummings Oil Co.'s Dorsey 1-A, 15-Q-25, abnd 2511.

McLean County—Failure: Miller Shirella's Howell 1, 8-M-27, abnd 1704.

Warren County—Failures: Puckett & Sleger's Gallaway 1, 2-D-37, abnd 693.

Puckett & Sleger's Howell 1, 2-D-37, abnd 773.

MICHIGAN WILDCATS

Bay County—Failure: H. E. Bell's Kehr 1, nw ne se 31-16n-3e, Dundee lime 3189, abnd 11-30-46 at 3402.

Kent County—Failure: Rex O&G Co.'s Beals 1, ne nw se 34-10n-11w, abnd 11-29-46 at 2420.

Mecosta County — Morton Gas Discovery: Michigan Consolidated's Stickler 1, c sw 15-14n-8w, Stray sand 1279, flow 1,600,000 gas, comp 11-27-46 at 1282.

MISSISSIPPI WILDCATS

Issaquena County—Failure: C. H. Osmond's Anderson-Tully Lbr. Co. 1, ne sw 9-17n-3e, Wilcox 2905, Tuscaloosa 6507, Massive sd 7209, abnd 11-23-46 at 7706.

Lamar County—Failure: Humble's J. F. Fowler 1, nw ne 27-2n-14w, abnd 11-24-46 at 10,500.

LeFlore County—Failure: J. Jones & Assoc.-S. J. Tucker's R. V. Howard 1, nwc ne ne 17-19n-2w, Chalk 3190, Eutaw 3925, abnd 11-22-46 at 4650.

NEW MEXICO WILDCATS

Lea County—Failure: Skelly's Yadon 1, c sw ne 11-16s-37e, elev 3796, anyhydrite 2130, base salt 3025, Yates 3160, San Andres 4938, abnd 11-30-46 at 5762.

San Miguel County—Failure: Phillips' Leatherwood 1, nw ne sw 2-15n-18e, elev 6963, granite 2690, abnd 11-26-46 at 2768.

OHIO WILDCAT

Holmes County—Failure: Ohio Fuel Gas Co.'s T. P. Butler 1, sw ne 30, abnd 11-23-46 at 2853.

SOUTH DAKOTA WILDCAT

Custer County—Failure: J. E. Dyer et al Gov't. 1, sw ne sw 30-5s-2e, Hell Canyon, Minnekahta 845, 851 TD, abnd 11-29-46 at 851.

SOUTH CENTRAL TEXAS WILDCATS

Atacosa County—Failure: Harris S. Stahl's Suzanna Pratt 1, 900 fr sl 300 fr el 176-ac lse, 3500 fr nw&swl F. de la Garza sur 46, abnd 11-20-46 at 2407.

Williamson County—Failure: J. O. Fox et al's Annie & Arthur Kerlin 1, 330 fr s&wl 126-ac lse, Pedro Zara sur, 4 mi n Thrall, Buda lime 1187, Eagleford 1139, Edwards lime 1540, abnd 11-1-46 at 1730.

Zavala County—Failure: David S. Ring's Chas. D. Matthews 1, 330 fr s&wl blk 15, sect 20, I&GN sur blk 2, 5400-ac lse, abnd 11-21-46 at 2360.

SOUTHWEST TEXAS WILDCATS

Duval County—Failure: John F. Camp & Sons' Jas. F. Welder Heirs 1, 1650 e of wl 2310 fr nl 420-ac lse, 6920 fr wl 4910 fr nl Samuel Alexander sur 102, 1 mi w Seven Sisters prod, abnd 11-22-46 at 3130.

Webb County—Failure: Interstate Minerals' R. Lopez 66, 2310 s of nl sur 309, 3650 w of Glen prod, 963-ac lse, 12 mi s Mirando City, abnd 10-30-46 at 1825.

Zapata County—Failure: Government Wells Oil Co.'s Juana Garza de Uribe 2, 1320 s&w fr nwc sur 109, TCRR sur 249, on 542.32-ac lse, sw Mirando Valley prod, 2 mi nw Cuellar prod, abnd 11-18-46 at 1419.

LOWER TEXAS COAST WILDCATS

Bee County—Failure: Birks Bros' Laura M. Rapp et al 1-C, 2200 fr nwl 467 fr swl T. B. Brashear sur, 154-ac lse, abnd 11-21-46 at 3695.

Kleberg County—Distillate Discovery: Sun's E. G. Canales 4, 660 s of nl 3294-ac lse, 4643 w of el CCSD&RGNG sur 339, 1 2/3 mi se Tijerina-Canales fld, pay 10,225, perf 10 shots 10,250-51, flow 129.75 bbls dist, 5,840,000 gas, 9.15 bbls wtr, ¼-in, tp 4800 lbs, comp 11-10-46 at 10,554.

Victoria County—Failure: Sterling O&R Co.'s J. J. Welder 2-A, 50 fr sel 1200 fr nel IRR Co. sur 9, 9600 sw Sterling's Welder 2 gas disc at Welder Rch fld, abnd 11-15-46 at 6032.

LOWER TEXAS COAST OUTPOSTS

Hidalgo County—Santa Maria Failure: La Gloria Corp.'s S. Mercedes 2, c lot 16, sect 63, Loma Grande Gr, 3/4 mi nw Unit 1 gas-dist disc, abnd 11-18-46 at 8885.

Kleberg County—Borregas Extension: Humble's King Rch-Borregas 3, 5138 nw Well 1, disc, on 40,591-ac lse, 38,699 fr el 36,000 fr nl Sta. Gertrudis Gr, shut in as potential gas well, no gge, comp 11-15-46 at 8383.

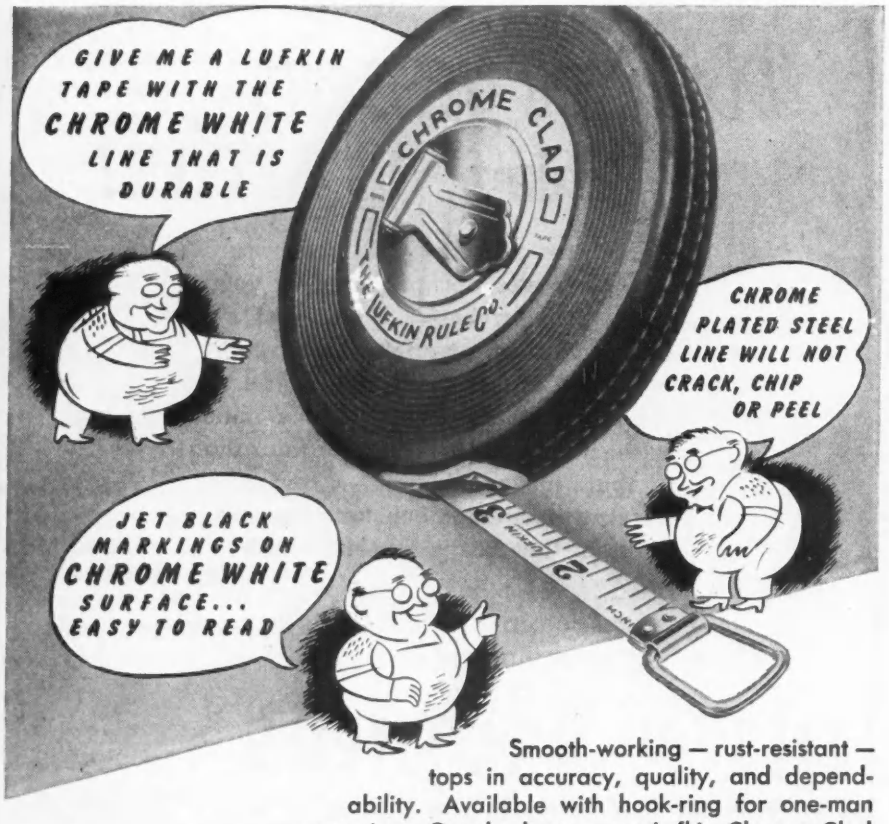
UPPER TEXAS COAST WILDCATS

Brazoria County—Failure: McCarthy O&G Corp.'s T. L. Smith et al 1, start sely e cor Humble 83-ac lse go 660 se alg swl 330 nely at ra, on 720-ac lse, J. H. Bell 1½ Lge, 1 mi se W. Columbia, abnd 11-24-46 at 10,870.

Chambers County — Distillate Discovery: Standard of Tex.'s State-Galveston Bay 1, Min. Lse 27129, 660 fr swl 1320 fr sel sect 201, 1 mi ne Red Fish Reef prod, sw Smith Point prod, 640-ac lse, pay 8752, perf 112 shots 8752-66, flow 288 bbls 53.6-gr, ¼-in, gor 11,490/1, tp 2250 lbs, comp 10-31-46 at 11,390.

Plant Expansion Planned

An $800,000 expansion program at its Hillyard, Wash., refinery has been announced by Inland Empire Refineries, Inc. Plans are to add production of coke to present output of the plant. Henry D. Moyle, president, said Spokane is a potential market for 15,000 tons daily of coke and that at the outset the new plant will produce about 5000 tons a day. Charging stock will be heavy crude from the company's wells in Montana.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■ One Super D. Fort Worth spudder, telescope steel mast, mounted on steel skids with motor attached with V-belts. Caterpillar Diesel motor. One Jumbo C. Fort Worth spudder, telescope steel mast mounted on steel skids with motor attached, endless flat belt and Caterpillar Diesel motor. Can be seen south of Mattoon, Illinois. D. B. Lesh, Box 113, Altamont, Illinois.

■ 1 F x F 4 x 5 Gardner Denver Slush Pump 250' 2⅜ OD Sullivan N Rod Yellow Strip. Both items are new and will not split them. George R. Miller, Box 61, Pinedale, Wyoming.

■ Complete power rig consisting of the following: Model U-10 Unit Rig Company Drawworks powered with 3, Model D-13000, Caterpillar Diesel Engines, compounded.
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2—Model 922, 12½ Ton Tandem Axle, 150 H.P. Cummings Diesel motors, Dual winches, Each truck rigged for oil field work. 11:00 x 24 tires. $7500.00 each.
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1—Tandem Trailer, Pole, Fruehauff, 11:00 x 20 tires, Air brakes. $2000.00.
1—Tandem Trailer, Pole, Fruehauff, 11:00 x 24 tires, Air Brakes. $2000.00.
2—Single Axle Trailers, Pole, shop made, 9:00 x 20 tires, Air brakes. $500.00 each.
All Tires in Good Condition.
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■ Lumber for sale: 5 cars 3 x 12—10' to 16' Hardwood $49.00. 5 cars 3 x 6 & wider Hardwood roadway lumber $43.00 to $49.00. Fir timbers 12 x 12 & larger 40' to 120' in length. 1 x 2 and 2 x 2 Surveyor stakes. Hardwood pallets for sale. E. J. Gaiennie Lumber. Box 1074, Shreveport 89, La.

■ NEW CORE DRILL: Franks Model FA—Heavy Duty hydraulic, kelly drive, rated 1500 feet. 4½" x 6" Gardner-Denver pump. 27 foot mast. Mounted on 138" wheel base, 1946 model 4-wheel drive 3 ton Oshkosh truck; 10 speed, with 9:00 x 20 ground grip tires, dual rear. Hercules 320 cu. in. engine. Factory mounted Tulsa 18 winch in front. 140 feet new 2⅜" drill pipe, kelly, bits, hose and tools included. Designed for core, shot-hole, or water well drilling in difficult areas. Drill completed in September, tested, but never used. Location, Colorado. Price $12,000. Identical drill working same area. Same unit present cost in excess $13,500. Box 101, The Oil Weekly, Houston, Texas.

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■ DRILL PIPE—6500 feet 4½-inch grade D range 2 National Internal Upset with Hughes Acme Streamline joints. Excellent condition. Located Taft, Texas. Hancock Drilling Co., 7045 Chocolate Bayou Road, Houston, Texas.

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■ Geologists, Micropaleontologists, Petrographers, and Petroleum Engineers wanted for service with major oil company in South America. Salary dependent on qualifications. Applications may be made in person or by letter to: Gulf Oil Corporation, New York Production Division, 17 Battery Place, New York 4, N. Y., Room 1633.

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■ Geophysicist wanted by expanding contract geophysical company. Must have thorough experience in review interpretation of seismic data, preparation of final maps and reports. Preferably also experienced in gravity interpretation and mapping. Permanent location at Dallas, Texas. Please state education, age, experience, salary expected and date available. Address Box 103, c/o The Oil Weekly, Houston, Texas.

■ Unusually attractive opportunity for experienced seismograph party chief. Apply in care of the Oil Weekly, Box 104, Houston 1, Texas.

SITUATION WANTED

■ Petroleum Engineer with Major Company for eleven years; superintendent of operations for five years; capable of assuming full responsibility for drilling and production program. Just returned from 28 month tour of overseas duty with Army Corps of Engineers and is seeking a responsible position with a drilling and production company. Can furnish best of references. Box 99, The Oil Weekly, Houston Texas.

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SQUEAKS from the BULL WHEEL

Poet's Nook

Asking a woman her age
Is like buying a second-hand car.
The speedometer has been set back
But durned if you can tell how far.

Shovel Wanted

A grave digger did his job so well that he couldn't climb out. He shouted, but none could hear, and finally the chilly night descended.

At last a drunk happened along.

"Get me out of here! I'm cold."

The drunk peered into the grave. "S'no wonder you're cold. You haven't any dirt on you."

The Woman's Way

One difference between a man and a woman is this: No man in his right mind and with 15 cents in his pocket would go in a store and try on nine suits and 14 hats.

Life Is Like This

"Fishing?"

"Nope. Drowning worms."

The Man's Way

"John, you're awful. You sit there night after night reading your paper and don't pay any attention to me. You don't treat me the way you used to. You don't love me any more."

"Nonsense. I love you more than ever. I worship the ground you walk on. Your every wish is my command. Now if you don't shut up and let me read this newspaper I'm going to beat your brains out!"

Playing It Careful

"Are you a salesman, bill collector or a friend of the boss?"

"All three."

"Okay, then he's at a conference; he's out of town; step right in and see him."

Naturally

"I want a sweater for my dog."

"Yes, Madam. How large is the dog?"

"Oh, he's not large and not small."

"I can't fit him from that description. Why don't you bring the dog here and try a sweater on him?"

"Why, how absurd. I want to surprise him!"

Hints for Householders

"What would I have to give you for a kiss?"

"Chloroform."

He Earned the Money

A man boarded a pullman and gave the porter $5 to wake him up when the train reached Podunk at 4 a.m. "Now, porter, I'm a very heavy sleeper, so you may have to drag me out of the berth, put my clothes on me, and carry me out to the platform. And no matter how much I resist, don't pay any attention."

Next morning the man awoke to find himself in New York. Boiling mad, he sought out the porter and roundly cussed him out.

The porter shook his head in admiration. "Boss, you sho' has got a temper, but it ain't nothin' to compare to the gent'man's that I put off the train this mornin' at Podunk."

Definitions

Diplomacy: The art of cutting a guy's throat without using a knife.

Friends: Two women mad at the same person.

Gold: A metal dug out of holes for dentists and government to put back in.

Radio: An advertisement with knobs.

Keepsake

"My hair is falling out, Barber. Could you give me something to keep it in?"

"Sure. Here's a cardboard box."

Another One

"Was your tie red when you came in here?"

"No, Barber. Why?"

"Gosh!"

Kind to Animals

A Sunday School teacher was showing her class of little boys a picture of four Christian martyrs in a lions' pit.

One lad looked very sad. "Gee, look at that lion way in the back. He won't get any!"

That Explains It

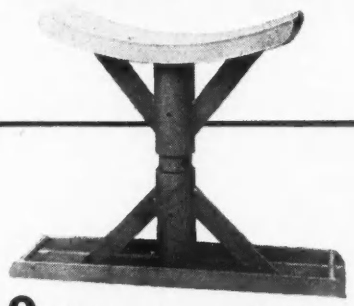
A theater usher was astounded to see a bear sitting on the front row, placidly munching peanuts.

"Say, you! You're a bear. What are you doing in this theater?"

"Why, I enjoyed the book so much I thought I'd like the film."

OWEN

SAFE SUPPORT FOR HEAVIEST BOILERS



OWEN Boiler Jacks are rigidly constructed and well braced to safely support the heaviest boilers, yet they are designed so that one man can easily move them into position and level the boilers.

Heavy channel iron cradle and base, welded-on seamless posts, heavy welded braces, 3½" O.D. lift screw . . . these assure long service under severe conditions. Correct design, careful workmanship . . . *these* simplify operation and make it easy to keep boilers in absolute level position.

Compare your present boiler supports with Owen Boiler Jacks . . . we believe you'll want a set of the jacks right away. They're available for immediate delivery through your supply store.

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HOUSTON, TEXAS

Charles R. Allen has been made California regional manager of the production department of Continental Oil Company, with headquarters at Los Angeles, succeeding **R. E. Collom,** retired vice president who has been in charge of the department for 15 years. Collom will continue as director of the Kettleman North Dome Association. He has been with Continental more than 30 years. Allen was formerly proration engineer before his promotion, and has been on the company's production staff more than 23 years. He is a native Californian.

Charles R. Allen

»

Dr. Royal W. Sorenson, professor of engineering at California Institute of Technology, addressed engineering students of Rice Institute, Houston, December 7.

»

Raymond C. Fogleman, former industrial salesman in the Houston division of United Gas Corporation, has been appointed division supervisor of industrial and commercial sales. He will be responsible for gas supply contracts with industrial and commercial consumers in the Houston area. He joined United as a meter reader in 1927 and successively filled positions in the clerical department, pressure control and measurement departments and as industrial salesman. During the war years he was temporary supervisor of industrial and commercial sales.

»

O. L. Chenoweth, Jr., petroleum engineer for Gulf Oil Corporation, Fort Worth, has resigned to join the Montex Drilling Company, Fort Worth firm recently organized by **W. A. Moncrief** and associates to operate in West Texas.

»

M. H. Mitchell, division landman for Tide Water Associated Oil Company at Casper, Wyo., has been transferred to San Francisco, where he will be assistant to the general land manager. He will be replaced at Casper by **A. E. King** from the Bakersfield, Calif., office.

»

Don Gilman and **John Pierce** of Western Oil and Gas Association, represented the oil group at meetings of the taxation and highway committees of the California State Chamber of Commerce in San Francisco December 4.

»

Guy E. Miller, geologist for Shell Oil Company at Denver, has been transferred to the company's Long Beach, Calif., office.

»

George A. Peterkin, vice president and treasurer of the Latex Construction Company, Houston, has been named a member of the board of directors of the Fidelity Bank and Trust Company.

L. M. Eldridge, petroleum engineer with Creole Petroleum Corporation has returned to his headquarters in the Quiriquire field, Venezuela, after spending his vacation in the states. Eldridge, a graduate of Texas A. & M. College, has been with Creole eight years.

»

Paul J. Bond has become general traffic manager of The Pure Oil Company with headquarters in Chicago. Bond has been in Pure's traffic department since 1920 with the exception of a two-year war service period when he was with PAW in Washington, and as Director of Supply and Transportation for District 2.

»

James E. Low, West Texas-New Mexico district superintendent for Amerada Petroleum Corporation and an employe since March, 1928, has been transferred from Midland to Fort Worth to become division superintendent of Texas and New Mexico operations. He succeeds **F. Wayne Covault,** who retired October 1. **Joe Hathaway,** former assistant to Low, has been elevated to district superintendent at Midland, with **Ray Seifert,** who has been stationed in Colorado, as his assistant.

»

Milton W. Lewis, Los Angeles consulting geologist, has been named chairman of the publicity committee for the Pacific Section of AAPG.

Sidney A. Swensrud was appointed executive vice president of Standard Oil Company (Ohio) and **Earl D. Wallace** and **Samuel H. Elliott** were made vice presidents as a result of the separation of the production, supply and transportation division into three departments. Swensrud is in general charge of all three departments as well as the manufacturing department. He joined Sohio as assistant to the president in 1928, going from the staff of the Harvard School of Business Administration. He has been a vice president since 1939. Wallace will be in charge of production, Elliott in charge of transportation, and **Richard C. Sauer** will be in charge of distribution.

Sidney A. Swensrud

»

Dr. J. Brian Eby, consulting geologist of Houston, addressed a luncheon meeting of the Houston Geological Society December 9 on "The Oil Situation in Western Europe. Dr. Eby recently returned from a trip to Europe as staff representative of THE OIL WEEKLY.

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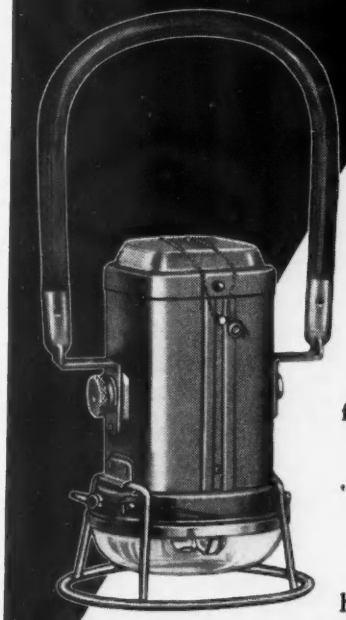

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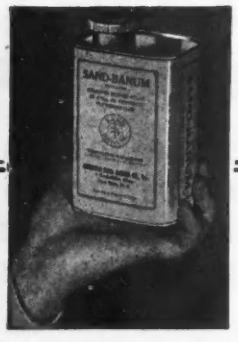

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Joe. B. Watt of Houston, who will retire from The Texas Company in January after 31 years of service, last week was presented with a gold watch in recognition of his long service. **W. B. Williams** and **Dave Harrell,** both of Humble, Texas, recently completed 30 years with The Texas Company and also were given gold watches.

»

Eugene H. Beard, Tulsa, has joined the sales force of The Republic Supply Company and will be engaged in city sales work in Tulsa. Beard started in the supply business in West Virginia. He formerly was with Jarecki Manufacturing Company.

»

John E. Watson will be in charge of the new Shreveport office of Sinclair Prairie Oil Company. He formerly resigned to work for British American Oil Producing Company and Ashland Oil & Refining Company, and has returned in the position of district landsman. **W. R. Fleming,** scout, represents the company in the area.

»

C. A. Cowan has been transferred from Lafayette, La., to Shreveport by Union Oil Company of California. He is in the geological department.

»

W. J. Gillingham, division superintendent, Schlumberger Well Surveying Corporation, discussed "The Interpretation of Electrical Logs" before the geology and petroleum engineering students of Louisiana State University.

»

D. O. Johnson of the Johnson-Fagg Engineering Company, Tulsa, spoke on "Oil Well Pumping Studies" before the Kansas Society of Petroleum Engineers at Ellinwood, Kansas.

»

L. J. Neuman, consulting geophysicist, was the speaker at a luncheon meeting of the Houston Scouts and Landmen's Association December 5. He discussed present methods of geophysical exploration and further potentialities of geophysics.

»

Harry B. Coen has been placed in charge of the employe cooperation staff of General Motors Corporation, succeeding vice president **Frank R. Pierce.** Coen was director of labor relations on the personal staff before his promotion.

»

Dr. C. Earl Webb has been appointed chief engineer of the American Bridge Company, U. S. Steel Corporation subsidiary, succeeding **Dr. Charles F. Goodrich,** who has retired after 40 years with American Bridge.

»

R. A. Feemster has been employed by American Iron & Machine Works Company as sales representative in the Oklahoma City district. He formerly was division sales manager for Kobe Company. He has also been connected in an engineering capacity with Phillips Petroleum Company and The Baroid Company.

W. E. Wilson, veteran employe of United Gas Corporation, has been appointed director of public relations. He joined the organization in 1932 as special representative for the general office administrative department.

»

J. A. Martino has been elected executive vice president of National Lead Company. He is also a director and member of the executive committee, and a former vice president.

Deaths

George X. Michel, Byron Jackson Company representative until his retirement August 1, died November 11 at Santa Barbara, Calif.

»

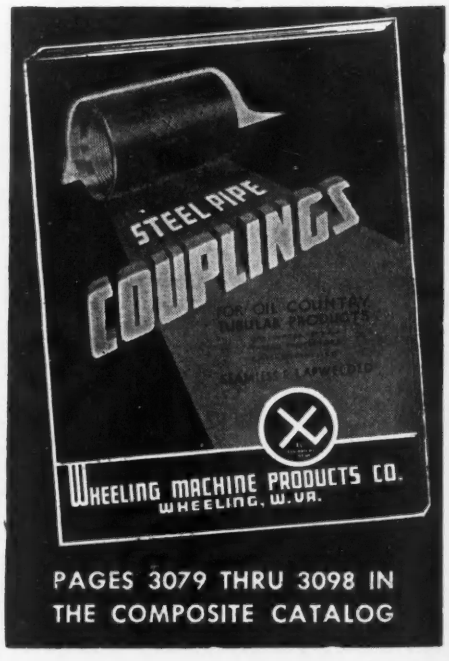
John J. Allinson, 63, Alief, Texas, former vice president of The Lion Oil & Refining Compay and the Waters-Pierce Oil Company, and recently chief resident engineer for the Oak Ridge atomic bomb project, died December 2. At the time of his death he was president and executive engineer of J. J. Allinson & Son Construction Company.

»

Dr. Otto Barsch, German geophysicist, died in Berlin. He was acknowledged a leader in the science of geophysics and the author of numerous papers.

»

Paul M. Pope, Sr., 65, independent oil operator of Houston, died of a heart attack November 28. He had gone to Houston a month before to help organize the Apex Oil Corporation, of which he was president. He practiced law in Oklahoma City prior to engaging in the oil business, and had also been connected with banking, insurance and coal mining.



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Suggestions Offered Prospective Buyers of War Surplus Engines

Prospective buyers of war surplus engines should consult established distributors of the manufacturer of these engines for suggestions about the possibility of converting them to peacetime use, according to Stewart & Stevenson Services, General Motors Diesel Engine Distributor at Houston.

Both gasoline and diesel engines manufactured and fitted strictly for wartime uses are being offered to buyers as "ideal for commercial use," "built for long life, dependable service and economic operation," etc. But many of these surplus engines are not ideal for commercial use in their present form. Most diesel and gasoline engines manufactured during the war were built and adjusted to the highest possible power output, whereas in taking the most horsepower out of an engine, long life frequently must be sacrificed.

"We can understand the desire to purchase engines as cheaply as possible," declared Joe Manning of Stewart & Stevenson Services. "We do hope, however, that the parties interested in surplus engines will consult their local distributors of the engines in question before making purchases of such equipment. By doing so, they will obtain invaluable advice concerning a given conversion to a particular installation; advice which may save them considerable grief later on."

Goodyear Officials Leave for New Plant in South Africa

Six top officials of Goodyear Tire & Rubber Company's new tire and mechanical goods plant in Uitenhage, South Africa, are leaving to assume their overseas posts.

Heading the group is V. L. Follo, whose appointment as general superintendent of the new factory is announced by George K. Hinshaw, vice president and production manager of Goodyear foreign operations.

Follo's chief aids will be N. A. Nigosian, engineering manager, and these four division superintendents: Fred B. Conrad, Eldred L. Stanley, A. F. Novick and Harold Wilson. Eighteen production employes have been selected to go to South Africa as temporary labor trainers.

The main factory building of Goodyear's new plant is 900 feet long, housing tire and tube manufacturing facilities. A separate mechanical goods unit measures 300 by 100 feet. Employing about 500 persons at first, production of the Uitenhage plant will be geared to the South African market.

750 Attend Houston Exhibit of International Harvester Trucks

An estimated 750 oil men and operators of heavy-duty equipment attended the showing of the new International Harvester heavy-duty trucks at the company's Houston showroom December 3. Four of the company's latest models were shown, three of which are specifically adapted to oil field work. The two 65,000 gross vehicle weight off-the-highway trucks exhibited have six-wheel drives. One is gasoline engine driven while the other is diesel-engine driven. A 30,000-gross vehicle weight truck-tractor was also shown. All three new vehicles were manufactured at International Harvester's Emeryville, Calif., plant, constructed especially for these heavy-duty trucks.

The Houston event marks the eighth showing in this country of these new trucks. The last showing will be in Shreveport December 10.

WAA Trims List of Veterans Eligible for Surplus Goods

The overabundant mass of priority certificates of World War II veterans who no longer wish to buy surplus property will be eliminated from the files of the Houston regional office of the War Assets Administration, so that veterans still desiring surplus items will have a better chance to buy, it was announced by N. A. Hallonquist, chief of the veterans' division, Houston WAA.

The step, designed to reduce to a minimum the number of veterans' priority certificates in the active files, is being taken by WAA offices throughout the nation.

Firm Located

The firm of Brown & Beckley, successor to the late I. Frank Brown, export representative, is located at 30 Rockefeller Plaza, New York 20. The company represents A-1 Bit & Tool Company, Dunigan Tool & Supply Company, Foreign Pressure Welding Equipment, Fred I. Getty, Haynes Stellite Company, Linde Air Products Company, and Texas Rubber & Specialty Corporation.

Bovaird Stockholders Reelect W. M. Bovaird, Other Officials

Stockholders of the Bovaird Supply Company of Tulsa reelected all directors. They are W. M. Bovaird, president; Frank Bovaird, vice president; D. M. Bradley, vice president in charge of sales; D. D. Bovaird, treasurer, and R. W. McMahan, secretary.

The company is celebrating its Diamond anniversary, having been started in Bradford, Penn., 75 years ago by David Bovaird. The third generation of the Bovaird family now is operating the company, which is a distributor of oil industry equipment in Oklahoma, Kansas, Illinois and Texas.

Joseph Glenn & Sons to Represent Manhattan Rubber in Philadelphia

Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., has announced that Joseph Glenn & Sons, Clifton Heights, Penn., will represent them in the Philadelphia area.

The Glenn organization will carry a stock of conveyor, power transmission, V-belts and hose of all types. This warehouse stock and a factory stock less than 100 miles from Philadelphia is expected to prove advantageous to Manhattan customers in the district.

Continental Operating 99 Stores In U. S., Canadian Oil Fields

With the opening this month of The National Supply Company's store in Rock Springs, Wyo., the company now has 99 stores in the oil fields in the U. S. and Canada, according to A. W. McKinney, vice president and general manager of sales. C. W. Morris, who has been manager of the Casper, Wyo., store, is manager of the company's newest outlet.

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Wage Hike Sought

A 25-cents-an-hour wage increase was sought by CIO oil workers in conferences last week with California major oil company representatives. Spokesman for the Oil Workers International Union was J. E. Brown, CIO district director at Bakersfield, Calif. Field, refinery and pipe line workers in certain companies are affected.

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